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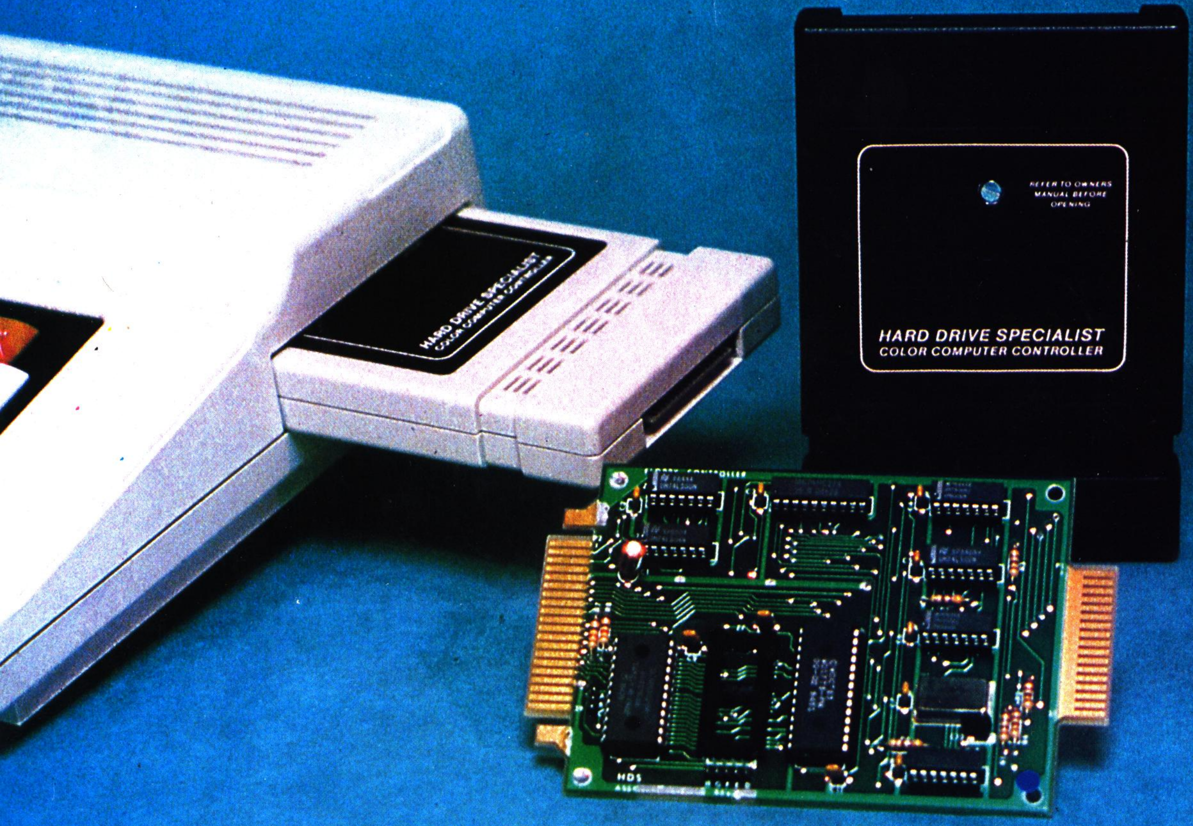
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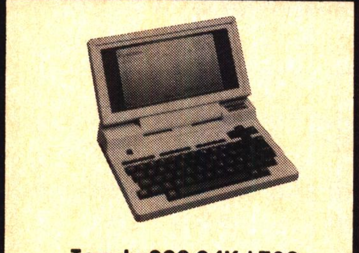

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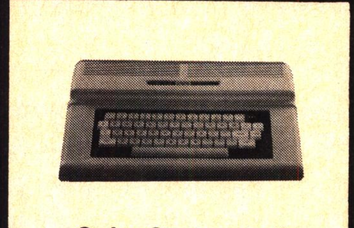

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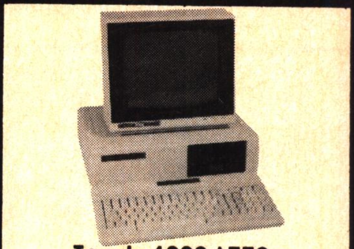

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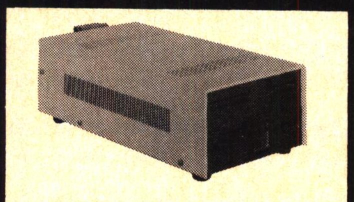

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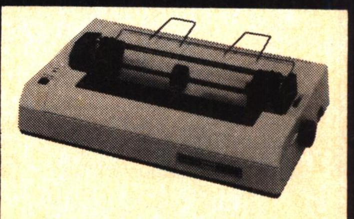

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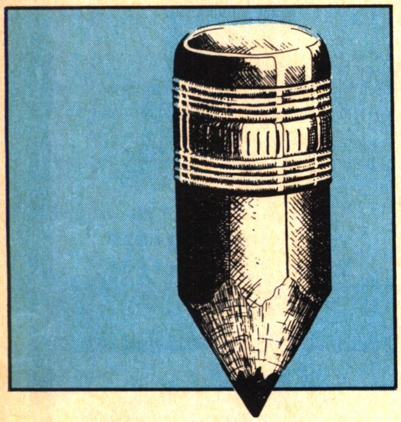

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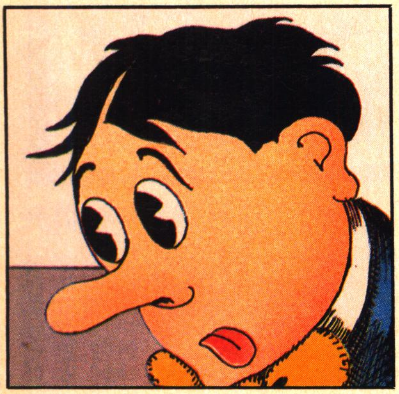

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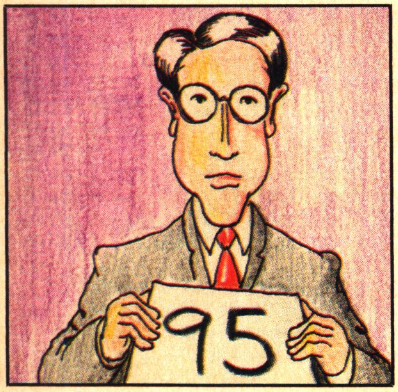

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The small cassette tape symbols beside features and regular columns indicate that the program listings with those articles are on this month's RAINBOW ON TAPE, ready to CLOAD and RUN. For full details, check our RAINBOW ON TAPE ad on Page 89.

NEXT MONTH: As autumn ushers in its picturesque brilliance, THE RAINBOW blends into the season with its Graphics issue. You'll see the smoothness and speed of animated graphics with *Digital Aquarium*, a fascinating representation of "life in a fish bowl," and "CoCo Gallery" will present its usual vivid display. For hardware enthusiasts, October marks the debut of a new RainbowTech column by Dennis Kitsz. For practical users, longtime contributor Richard White continues his spreadsheet tutorial in "Accessible Applications." There'll be games to test your wits, down-to-earth programs for serious use, and a complete update on "CoCo Clubs." Also, a nationwide directory of CoCo Bulletin Board Systems.

Experience October's multicolored RAINBOW! We've got more information for your Color Computer than any other source.

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The RAINBOW

September 1985 Vol. V No. 2

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LETTERS TO THE RAINBOW

No Obligations Required

Editor:

I'm writing in response to a letter in the July 1985 [Page 6] issue of THE RAINBOW. F.C. Caswell complained about programs that don't work on disk systems. He specifically pointed out Michael Repasy's program "Run For Your Life" [April 1985, Page 18]. He said, "If Mike wants me to use (or sometime, buy) his programs, he should write them for disk users and include a tape modification." I have a disk system, also, but I must try to see Mike's side, too.

Maybe Mike doesn't have a disk system. He can't very well write programs for a disk system if he doesn't have one, can he?

Secondly, programmers who send programs to a magazine do it as a favor to the readers, not a responsibility. He had a good program, so he shared it with all of us. He's not obligated to make it satisfy everyone.

If you have any further comments, write me at Route 3, Box 120-A, 29630.

Chris Cope
Central, SC

Using CoCo to Close the Gender Gap

Editor:

I have been a devoted fan of yours since purchasing my first CoCo. I have since done my own 64K upgrade (with chips ordered from one of your ads). I have taught my 4-year-old daughter where the letters are on the keyboard (using *Early Games* ordered from one of your ads).

I also am now the computer teacher in our school since I learned enough on the CoCo to take over the job.

Just wanted you to know that there is at least one woman who uses CoCo and THE RAINBOW constantly. And I don't have a recipe or a checkbook program!

Sandra Roosa
Stone Ridge, NY

The Powers of CoCo

Editor:

I am writing to tell you how much I enjoy your magazine. I am a computer repair technician and I work on 32-bit super minicomputers; I feel the power of the CoCo is just as good as those larger machines. The graphics and basic processing properties of the CoCo are very easy to understand, which makes the programming of this machine a breeze as compared to the larger system.

A big part of the understanding of the CoCo's power was due in large part to your magazine. The programs and projects are well-documented and the reviews section really gives me an idea of how different programs can be used for my various needs.

Again, thanks for the great magazine and keep up the good work you have been doing.

Donald F. Saunders, Jr.
East Brunswick, NJ

Editor:

Your January "Beginners Issue," with its multitude of short programs and continuing "One-Liner Contest," is a hunt-and-peck typist's paradise!

Two requests for your readers: 1) Is there anyone out there with a program to keep track of all these magazines? 2) How about a CoCo users group in the York-Hanover area? Write me at 509 Delone Ave., 17344.

I've looked at other magazines, but I cannot find anything "over" THE RAINBOW!

Douglas B. Klunh
McSherrystown, PA

'Round and 'Round We Go with RND

Editor:

I can see poor Daniel Pardue of Gretna, La., taking your advice in the July 1985 [Page 8] issue concerning the `RND` function. It seems he was told that `RND(1)` returns a number between zero and one and that simply changing `RND(0)` to `RND(1)` would solve his problems. Wrong! Picture his frustration. `RND(1)` will *always* return a value of one. The lines he specified containing the `RND` function, `N=INT(1945*RND(0)+1)` and `X=INT(10*RND(0))` will work without modification because `RND(0)`, not `RND(1)`, returns values between zero and one. Anyone wishing a detailed explanation can send me a SASE; my address is P.O. Box 385, 29556.

Also, to everyone with valuable disks containing I/O errors: You may have noticed that the Disk BASIC `BACKUP` command will not copy a problem disk onto a good disk. Any salvaging must be done file by file, which is very time-consuming. I have written a program called *Mirror Image* which will back up any disk, even those with I/O errors, onto a good disk. With this program, parts of programs and data files can be salvaged that would have been previously lost because of I/O errors.

To receive your free copy of this program, send me one blank, formatted diskette (Disk BASIC compatible) and $2 to cover the return postage.

If anyone has heard of a reasonably priced ($15-$20 range) `PMODE 4` screen print program for the Apple Imagewriter, please let me know!

I also have collected quite a stockpile of old RAINBOWS and a few other magazines. These magazines contain megabytes of useful CoCo information (`BREAK` disable, printer Baud `POKE`s, faster disk drive operation, `POKE`s for long life in video games, etc.). If there is something in particular you need to know how to do, I'd love to help you! Just send me the problem and a SASE (or call me at home 8-10 p.m. Eastern time Monday-Friday at 803-354-7073) and I will try to help out.

And, of course, to the staff of THE RAINBOW: You produce the best and, in my book, *only* CoCo magazine around! Keep up the good work!

Joey Staton
Kingstree, SC

Good News/Bad News

Editor:

I enjoy RAINBOW ON TAPE very much. I have some good news and some bad news. The good news is that my mom is letting me subscribe to RAINBOW ON TAPE! The bad news is I have to pay $20 of the subscription. So as soon as I earn enough money, you'll get my order. Thanks again.

Tim Paulus
Utica, MI

Speaking in ECB

Editor:

When I added a disk drive to my Color Computer system, I encountered the same problem reported by David B. Lamon in "Letters to Rainbow" [Page 7] in the June 1985 issue. My son has *Cookie Monster's Letter Crunch* (Radio Shack Cat. No. 26-2526), which is an educational game designed to run on a cassette-based 16K Extended Color BASIC system. The program will not run unless the disk controller is removed.

After studying memory maps and ROM listings, I have come up with the following method for reverting from Disk Extended Color BASIC to Extended Color BASIC:

1) Copy ROM to RAM (requires 64K) and switch to the all-RAM mode.
2) `POKE &H134,0:POKE &H139,0`
3) `POKE &HC000,0`
4) `EXEC &H8002`

Step 1) Causes BASIC to be executed from RAM where it can be modified. If one has J&M's JDOS, merely use the RAM command.

Step 2) Nullified the Disk BASIC token tables. This step is not required to run *Cookie Monster's Letter Crunch*, but is required if one wants to be able to get back to Disk Extended Color BASIC without turning off the computer. If the Disk BASIC token tables are not nullified, Extended Color BASIC reserved words, such as `PEEK` and `POKE`, cannot be tokenized properly.

Step 3) Causes the Extended Color BASIC initialization routine, when executed, to fail the test for the presence of the disk ROM and, therefore, bypass Disk BASIC initialization.

Step 4) Invokes the Extended Color BASIC initialization routine, setting the required memory map. The Extended Color BASIC start-up message appears when Step 4 is performed.

In order to make it easy for a child to revert from Disk Extended Color BASIC to Extended Color BASIC, I would suggest incorporating the four steps into a program which can be loaded and run from disk, as follows:

```
10 RAM
20 POKE &H134,0:POKE &H139,0
30 POKE &HC000,0
40 EXEC &H8002
```

If one does not have JDOS, a more complicated procedure would have to be substituted for Line 10.

To return to Disk Extended Color BASIC without turning off the computer, enter the following:

1) `POKE &HFFDE,0`
2) `POKE &H71,0:EXEC &HA027`

Step 1 returns the computer to the ROM/RAM mode and Step 2 performs a "cold start." Note that this procedure is good for any application which requires the memory map and function of Extended Color BASIC.

David A. Lynde
Arlington, MA

HINTS AND TIPS

Editor:

The program *Disk Merge* in your February 1985 issue [Page 175] is excellent. The additions on Page 8 of your May 1985 issue make it even better, *but* if you wish to select programs from several disks then it is necessary to keep running the program and selecting the drives.

The following lines allow using the BREAK key without the drives running. Further, they allow the choice of using multiple disks and remind you which drive you have selected as the source drive.

```
220 B$=INKEY$:IF B$="" THEN 220
221 IF B$<>CHR$(13) THEN 220
560 'ANOTHER DISK?
570 GOTO 700
700 PRINT@359,"END OF THIS DISK"
710 PRINT@423,"PRESS ANY KEY"
720 EXEC44539:CLS
730 PRINT@67,"ANOTHER DISK? Y/N"
740 A$=INKEY$:IF A$="" THEN 740
750 IF A$="Y" THEN 780
760 IF A$="N" THEN 800
770 GOTO 740
780 CLS:PRINT@132,"INSERT  NEXT
DISK":PRINT@164, "IN DRIVE ";S
790 GOTO 210
800 CLS:END
```

Now the program allows you to very easily make a special disk from your file of disk programs.

R. (Dick) Thwing, Sr.
Columbus, NC

Of Printouts and Praise

Editor:

I thought I'd write to pass on some information. To get a nice printout of your BASIC listing, use your word processor and the global change function. Change all the colons to a carriage return and five spaces. The result is a great looking listing. You can use all the functions of the word processor such as pagination, headers, etc. Of course, the program must be saved in ASCII format before loading into the word processor.

Also, the new CoCo 2 slim-line drives from Radio Shack are capable of 40 tracks and six ms step rates (by modifying Disk BASIC) without any I/O errors. They also appear to be capable of double-sided operation with the addition of another read/write head, and using an optical sensor for the head stop eliminates the "head banger" problem and keeps the head in alignment.

These drives also are much quieter than the older drives; they seem to read the disk faster, possibly with only one pass, and the rotation speed is better controlled. The disk RPM never increases more than .2 RPM, even after hours of intensive use. I can't wait to get Drive 1, which just plugs in. Radio Shack has come out with a winner!

Mark D. Griffith
Fort Myers, FL

Choose Your Color

Editor:

The Gemini screen dump program in the May 1985 RAINBOW [Page 18] was interesting but it can be easily improved. As it stands, it will only correctly copy a picture in `PMODE 4` with a light background. With a few changes, you can make it copy either a `PMODE 3` or 4 picture with any color background.

The changes needed are to add lines 5 and 6 and change lines 10 and 1000-1030:

```
5 CLS:INPUT"PMODE 3 OR 4";D
6 INPUT"BACKGROUND COLOR NUMBER
0-8";B
10 PMODE D,1:SCREEN1,1
1000 T=O:P=PPOINT (X,Y):IFP<>B
THENT=T+2
1010 P=PPOINT(X,Y+1):IFP<>B
THENT=T+3
1020 P=PPOINT(X+1,Y):IFP<>B THEN
T=T+4
1030 P=PPOINT (X+1,Y+1):IFP<>B
THEN T=T+8
```

By incorporating these changes, you are asked which `PMODE` you wish to use and the background color. The one drawback is that you can still only use two colors. Any color except the background color can be printed, but it will only be black on the paper.

Robert Toscani
Philadelphia, PA

Guide has Excellent Information

Editor:

The 1985 Radio Shack *Semiconductor Reference Guide* has a very good section on the chip used in the S/SC. Pages 109 to 116 have an incredible amount of information not found in the S/SC manual, such as allophone dictionaries and linguistic principles.

Reed Darsey
Mobile, AL

Any Key, Same Program!

Editor:

I'd like to thank the readers for sending in helpful hints for the CoCo. Now I have a little hint to help them. Instead of typing in this long line: (line number) `A$=INKEY$:IF A$=""THEN` (back to same line), try this in place of it: (line number) `EXEC 41172`.

It will have the same results. Just press *any* key and ta-daa! You are still in the same program.

Mark Clements
Woodbridge, VA

Editor's Note: Similarly, Mark, try `EXEC44539`. See this month's "Downloads" (Page 236) for more information on this.

Editor:

As a brand new CoCo user, I was immediately referred to RAINBOW by family and friends. My first issue was January 1985, and your cover is extremely applicable to our house! We solved part of the problem by connecting "Alex" up to a small black-and-white console. It is *much* easier on the eyes while I am trying to learn programming, and frees the color TV for the kids.

While I am crazy about THE RAINBOW, and spend hours pouring over ads and articles, I do have a request. Please remember there are lots of us out here who are new to the CoCo and to computers in general! I feel lucky if I understand one word in 10. How about a dictionary of terminology? Or at least remind each author to define abbreviations upon first usage in each article? It would help a lot of us catch on more quickly. (Thank you to Wayne Day for doing just that! I finally know what SysOps and SIGs are!)

Another thank you to the Albrechts. My first copy of *Dragon Smoke* arrived, and the penned-in comments let me know they not only read my letter, but understood, sympathized and want to help.

I would also like to commend our local Radio Shack manager, Greg. I have driven him crazy with questions and made every mistake possible. He has never yet lost his sense of humor — or his patience.

Thank you Radio Shack and thank you RAINBOW. Even in my frustration I'm having a great time!

Vicki Daubner
Concord, CA

KUDOS

Editor:

Please let me congratulate you on RAINBOW's fourth anniversary. I have been a subscriber to your magazine only a short while, but having seen several of the other computer magazines, believe me you are "head and shoulders" above them all. I really look forward to receiving each issue, and, while I go over every page of it many times, I particularly enjoy the One-Liners. My computering is strictly a hobby and I spend many enjoyable hours at the keyboard.

Jim Oakley,
Nashville, TN

Ubiquitous Users

Editor:

I vigorously support the theme of Jim Reed's editorial (April 1985, Page 16). Sure, many CoCo buyers are hackers and/or hobbyists — at first. But (at the risk of offending many) most of us eventually grow up and tire of playing games, then the CoCo shines as an appliance. We have two, one for home and the other for the office.

I know little about programming and have no interest except as required to get the machine to produce the results I want or need. (Ed Eller's rundown of stuff to fix my *Telewriter-64* is great.) FLEX, OS-9 and memory maps are no more interesting than the elastomeric properties of a pneumatic tire to a truck driver. To me, a computer is like a chainsaw to a woodsman.

Tandy has sold the CoCo as a game machine and much of the third party marketplace approaches the machine from the hacker/hobbyist viewpoint. So people don't see it as a "real" computer. I just brought my second CoCo home — my company finally entered the computer age and put HP-150s in our offices! They spent more for the software for each office than my entire system cost. The HP is a fine machine and software like *Lotus 1-2-3* is the "right stuff," yet few will really use 640K of RAM for ordinary business applications. What a shame we didn't buy CoCos!

And last, to software vendors: I don't even consider copy-protected material. We vigorously protect your copyright interests, but have no interest in playing dumb games in order to have your program on a working disk (which, of course, crashes from time to time).

William Sill
Tunkhannock, PA

Made Our Day

Editor:

I would like to compliment you and everybody involved with the publication of

VIDX video digitizer

Connects to the RS-232 port of your COCO, no need for Y-CABLES or MULTIPACKS! Runs on minimum 16K to 32K TAPE or DISK. Comes with software easily modifiable to your needs. WHY PAY MORE? Unlimited GREY scale when you use a color camera! The only digitizer that recommends you use a color camera!!!

VIDX-1....$99.95 + $3 POSTAGE
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VIDX-2 HAS A RS-232 SWITCHER BUILT IN.

VIZIdraw by George Ziniewicz
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BY GRAFX © 1985 CLIP DISK

No works of art, just lots of useful things that you can use to incorprate in giving your newsletters that special touch. All files are binary, you can use these with VIZIDRAW, GRAPHICOM, COCOMAX or whatever graphics utility that you're using. We recommend that you use SHRINX utility to make these any size you want (reviewed MARCH 1985 RAINBOW.
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RAINBOW magazine. Surely, no other magazine has been so well-targeted to the needs of its audience. I've subscribed to RAINBOW ON TAPE for the past three years as well as purchased a like number of copies of the magazine at newsstands.

I think my involvement with the CoCo and RAINBOW has been the most enjoyable hobby I've ever had. We also use the CoCo, *VIP Writer* and *Database* every day in our business, but the most use we get out of the CoCo is from software developed from programs published in your magazine.

Charles Massey
Little Rock, AR

He Made it Perfectly Clear . . .

Editor:

You appear to have quite an eye for a well-written article. I have never seen assembly code so well explained as in "Analog-to-Digital and Back Again" [June 1985, Page 36]. Nice job, indeed! Due to the small size of the program listings I was easily able to follow the BASIC program and compare it to the assembly code. Its small size enabled me to overcome my unwillingness to key it in, since I've only managed once to get an assembly code to load. Now I find I was inadvertently leaving out a third of the code!

Jeremy Spiller writes exceptionally well for one so young. I sincerely hope to read more of his work soon.

Michael L. Brant
Concord, CA

The Other Address for the Other Guy

Editor:

The Other Guy's Software has moved to a new location. Our address is:

The Other Guy's Software
55 North Main
P.O. Box H
Logan, UT 84321

Please pass this information on to the readers of THE RAINBOW.

Joseph S. Nielsen
Logan, UT

INFORMATION PLEASE

Editor:

Does anyone out there know of a complete statistical analysis program (oriented to sociology decision) for a 64K cassette-based Dragon (or CoCo; I have *DECODE* from CompuServe, U.K.)? I am a professor in a college. Please write to me.

Julian Colina
Costa del Sol, 16,
28033 Madrid Espana (Spain)

A Little Light Construction

Editor:

I am an avid CoCo hobbyist who reads THE RAINBOW every month. I am writing to ask for information on light pens. I have seen advertisements in your magazine for them, so I decided to be creative and try to build my own before I purchased one. I have a fair idea of how I would do it, but there is one missing piece: the location(s) in memory where I can find the coordinates for the television's scan line. Can you help me?

Also, I noticed a few people wrote in the June 1985 issue about a `PMODE 4` screen dump for Radio Shack (DMP) printers. I have written one and will gladly share it with anyone interested. For a copy, send a SASE and cassette or disk (formatted) to me at 144 Westminster Square, 53402.

Matthew Thomas
Racine, WI

Editor's Note: See "Why Not Build A Light Pen" on Page 90 of the April 1983 issue.

Building the Family Tree

Editor:

I am one of thousands of breeders who has bought a computer specifically for the purpose of tracing pedigrees. What is needed, however, is a program designed to print out a basic pedigree chart, including the animal's name in the places designated. Because many breeders line breed, the same animal can be repeated several times in a pedigree of any length.

Do you know of anyone who puts out a program for tracing pedigrees, or of someone who can modify a program I have (made for a Model III) to work on a CoCo? Write to me at 216 Orleans Street, Canada E1A 1W9.

Debbie Wilson
Dieppe, New Brunswick

Editor:

My father receives your magazine every month. Nearly everyone in my family uses it. My brother enjoys the games and my dad likes the utilities. I use the "Game-Master's Apprentice" section. In the past, I have found much of the information in that area very useful in my own role-playing games, which I play occasionally.

However, during the course of my short game life, I have discovered (as others probably have also) that the biggest pain in a campaign is creating characters. I would like to ask you if you have ever printed a program to aid in character generation, and if you haven't, would you please do so in the near future. Some timesaving features you might consider incorporating into it would be a dice "roller," something to tell you what classes your character could be (AD&D), and any pluses or bonuses your character would receive depending on his class and ability scores.

Marsha Brofka
Fairview Heights, IL

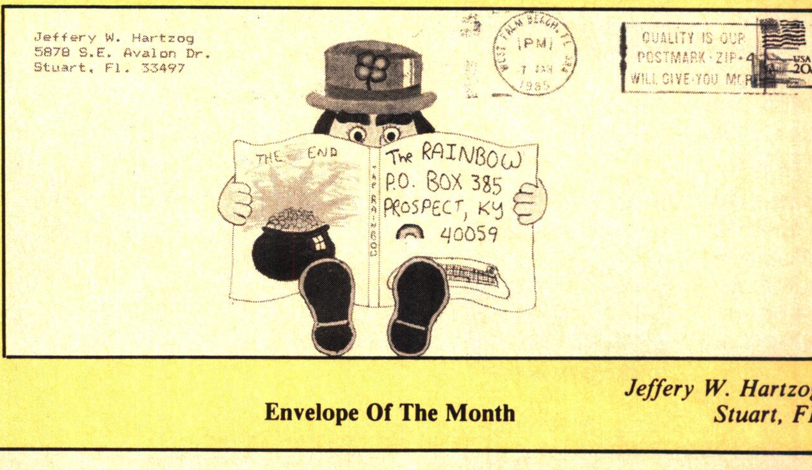
Editor's Note: See Bob Albrecht's "Creating Characters For Fun And Adventure," February 1983, Page 26. That issue is no longer available but you can purchase reprints of an article for $2. Please specify complete title, year and month when ordering.

Bill Nolan also wrote many excellent articles on this subject in his "Dragon's Byte" series which ended in June 1984. Check his "A Complete Character Generator" article in our February 1984 RAINBOW. Back issues *are* still available.

Also, see our "Index to Rainbow July 1981-June 1984" for other articles written by Bob Albrecht and by Bill Nolan. The July 1984-June 1985 index appears in the July 1985 RAINBOW.

THE RAINBOW welcomes letters to the editors. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or space.

ARTS AND LETTERS



Envelope Of The Month

Jeffery W. Hartzog
Stuart, FL

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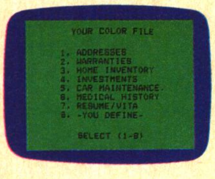

```
        YOUR COLOR FILE

   1. ADDRESSES
   2. WARRANTIES
   3. HOME INVENTORY
   4. INVESTMENTS
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   7. RESUME/VITA
   8. -YOU DEFINE-

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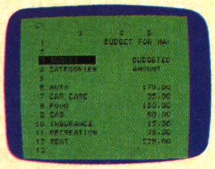

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            3          2     5
 1                     BUDGET FOR MAY
 2
 1 BUDGET              BUDGETED
 2 CATEGORIES          AMOUNT
 5
 6 AUTO                   170.00
 7 CAR CARE                35.00
 8 FOOD                   180.00
 9 GAS                     50.00
10 INSURANCE               15.00
11 RECREATION              75.00
12 RENT                   225.00
13
```

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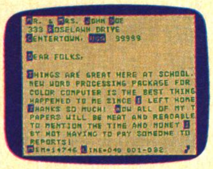

```
MR. & MRS. JOHN DOE
333 ROSELAWN DRIVE
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DEAR FOLKS,

THINGS ARE GREAT HERE AT SCHOOL.
NEW WORD PROCESSING PACKAGE FOR
COLOR COMPUTER IS THE BEST THING
HAPPENED TO ME SINCE I LEFT HOME
THANKS SO MUCH! NOW ALL OF MY T
PAPERS WILL BE NEAT AND READABLE
TO MENTION THE TIME AND MONEY I
BY NOT HAVING TO PAY SOMEONE TO
REPORTS!
MEM=14746 LINE=040 001-032
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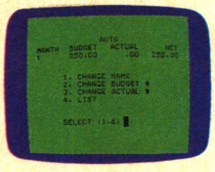

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                AUTO
MONTH  BUDGET    ACTUAL       NET
1      250.00       .00    250.00

    1. CHANGE NAME
    2. CHANGE BUDGET $
    3. CHANGE ACTUAL $
    4. LIST

    SELECT (1-4) █
```

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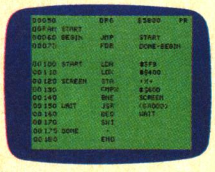

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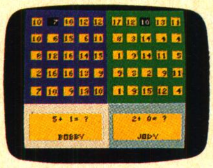
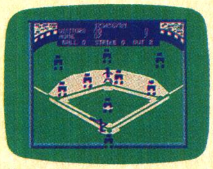
00050            ORG     $3800      PR
00FAH START
00060 BEGIN      JMP     START
00070            FDB     DONE-BEGIN

00100 START      LDA     #$F9
00110            LDX     #$400
00120 SCREEN     STA     ,X+
00130            CMPX    #$600
00140            BNE     SCREEN
00150 WAIT       JSR     [$A000]
00160            BEQ     WAIT
00170            SWI
00175 DONE       *
00180            END
```

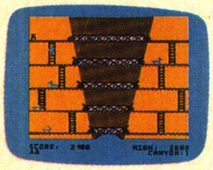
Bingo Math.* Three exciting games to make learning math fun. Bingo, Speed Math and Number Hunt. Was $24.95 in RSC-14. #26-3150 **19**95



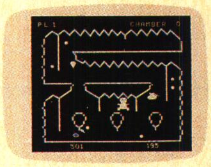
Baseball.* This exciting game plays like the big leagues! You are the coach—it's up to you to control the pitching, defense, and running for extra excitement. Fast paced baseball action. Was $24.95 in RSC-14. #26-3095 **19**95



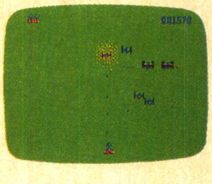
Canyon Climber.* Your climbing skills are tested when you find kicking goats, falling rocks, zinging arrows and more on your way to the summit. Was $34.95 in RSC-14. #26-3089 **29**95



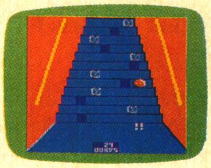
Downland.* You're alone in a secret cave, you jump and climb from chamber to chamber collecting gold and diamonds. Each chamber is a new danger. Will you survive? Was $24.95 in RSC-14. #26-3046 **19**95



Galactic Attack.* Enemy spaceships bomb your defense shields. If you destroy this squadron, the enemy reverts to a deadly night attack. Was $24.95 in RSC-14. #26-3066 **19**95



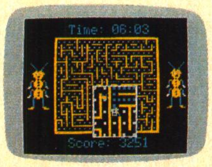
Poltergeist. Based on the hit movie. Search for clues and face the poltergeist. Not for parents or others easily frightened. Was $29.95 in RSC-14. #26-3073 **24**95



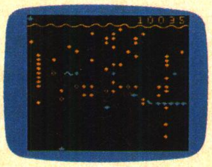
* Joysticks required.
** Cassette recorder required.
*** Joysticks and recorder required.

Color Computer at New Low Prices!

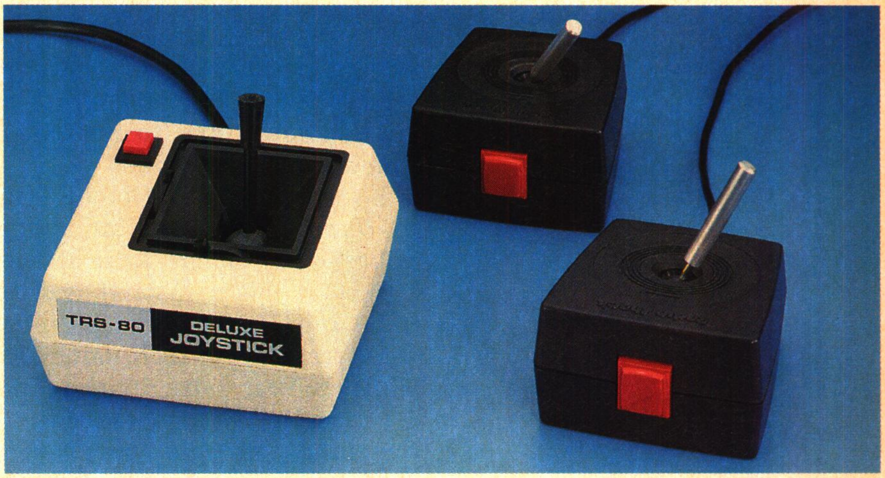
Mega-Bug.* A maze of fun! Try to lose the little "buggers" hot on your trail. You can't stop. Everywhere you go, on every turn, there's more of them! Excellent color graphics. Was $29.95 in RSC-14. #26-3076 **19⁹⁵**



Slay the Nerius.* Fast action is needed to save your submarines from deadly starfish and the ancient sea creature —Nerius. Was $24.95 in RSC-14. #26-3086 **19⁹⁵**



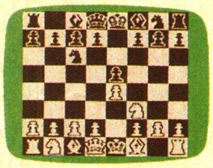
Clowns and Balloons.* A real circus act. Use your safety net to bounce the clown up and down to pop the balloons overhead! Be careful—don't let the clown fall. Was $29.95 in RSC-14. #26-3087 **19⁹⁵**



Deluxe Joystick. Get accurate cursor control and quicker response. Dual-axis trim controls. Was $39.95 in RSC-14. #26-3012 **29⁹⁵**

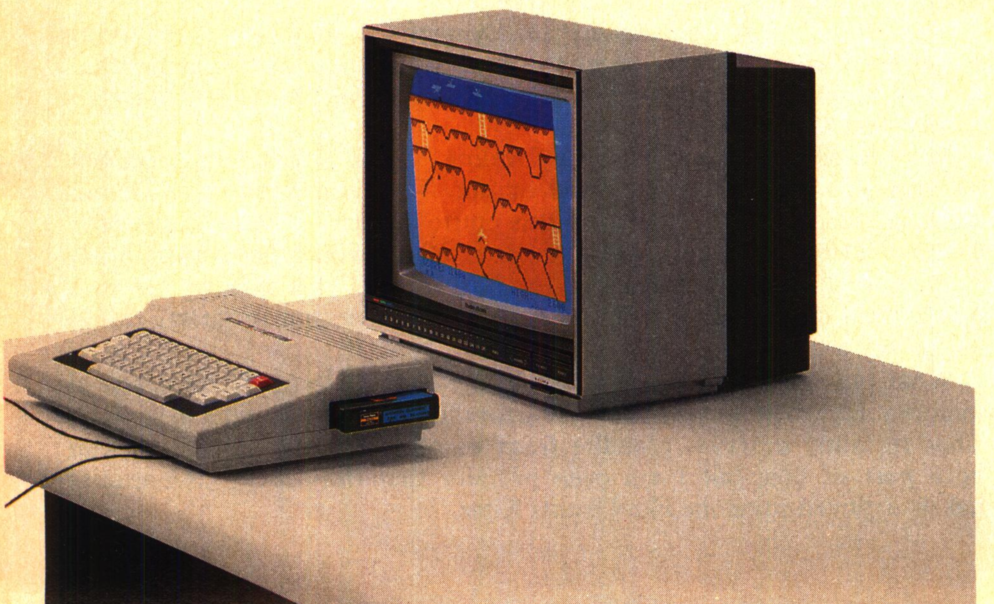
Joysticks. Two controls with full 360° movement! Single-shot button. A "must" for selected games. Was $24.95 in RSC-14. #26-3008 (pair) **19⁹⁵**

Cyrus. A chess program with beginner to tournament skill levels. You can take back a move or reject the computer's move and force it to play again. Was $24.95 in RSC-14. #26-3064 **19⁹⁵**



7 Card Stud. Compete with three computer poker players. They can adjust to your playing style and make it more difficult to win. Was $24.95 in RSC-14. #26-3000 **19⁹⁵**

7 CARD STUD LIMIT RAISE
997 JOE
HAL 997
4
1002 SID
YOU 998



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PRINT #-2,

Here at THE RAINBOW, we have been part of a large number of "firsts" in the Color Computer marketplace, but this month I would like to announce what may well be one of the most significant "firsts" of all.

Beginning with the October issue, THE RAINBOW will fulfill subscriptions to *Under Color*, the CoCo magazine which, since last year, has been published by Dennis Kitsz and edited by Debra A. Marshall.

Why is this a first? It is simply because, for the first time, readers of a Color Computer magazine which is ceasing publication will get full value received for their money paid. In this case, all *Under Color* readers with one-year subscriptions will receive the last three months of their term through THE RAINBOW. (*Under Color* subscriptions, like thoroughbreds, all were "born" on the same day. When you subscribed to *Under Color*, you were sent a whole set of back issues.) Those who subscribed to *Under Color* for two years will receive a cash refund for the additional year. Those of you who already subscribe to THE RAINBOW and who subscribed to *Under Color* as well will receive an additional three months tacked onto the end of your subscription to THE RAINBOW.

Contrast this, if you will, to several other Color Computer magazines which have gone out of business. One simply stopped publishing; the other "fulfilled" with a magazine which runs one monthly article on "TRS-80 Computers."

This, I happen to know, was one of the things which concerned Dennis Kitsz most of all in making a decision to cease publication of *Under Color*. It is a mark of Dennis' concern for people that they get fair value received for their good money paid to him for *Under Color*.

Dennis' other concern was that those many persons who subscribed to *Under Color* to read his articles would still be able to do so. To that end, Dennis joins our staff at THE RAINBOW and we will be adding his column to these pages on a monthly basis. Debra Marshall, who has a wealth of experience in Color Computer editing, will edit Dennis' columns — as she has for several years — and will also be involved with some additional assignments from time to time.

This arrangement is particularly satisfying to me, since we've been trying to attract Dennis to these pages for quite some time. At the same time, I am very pleased that a top-notch editor such as Debra will have an association with us, too.

Most important, however, is my feeling — and yours, too, I believe, whether you are directly involved or not — of appreciation to Dennis Kitsz for his personal concern in this entire project. It would have been easy for Dennis to "walk away" from it all; it would have most likely been more financially rewarding for him to "sell" his mailing list to a non-related magazine; or it would have been convenient to "string things along" for a while.

What prevented Dennis from doing any of these things is his personal integrity, regard for people and feeling for the CoCo Community in general. That certainly deserves plaudits from us all. I am proud that we can be a part of this, but I am even prouder that our CoCo Community has as a citizen someone like Dennis Kitsz.

Telewriter-64™

the Color Computer Word Processor

- **3 display formats: 51/64/85 columns × 24 lines**
- **True lower case characters**
- **User-friendly full-screen editor**
- **Right justification**
- **Easy hyphenation**
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- **Menu-driven disk and cassette I/O**
- **No hardware modifications required**

THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

> *...one of the best programs for the Color Computer I have seen...*
> — Color Computer News, Jan. 1982

TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

RAINBOW
CERTIFICATION
SEAL

File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

> *...truly a state of the art word processor... outstanding in every respect.*
> — The RAINBOW, Jan. 1982

PROFESSIONAL WORD PROCESSING

You can no longer afford to be without the power and efficiency word processing brings to everything you write. The TRS-80 Color Computer is the lowest priced micro with the capability for serious word processing. And only Telewriter-64 fully unleashes that capability.

Telewriter-64 costs $49.95 on cassette, $59.95 on disk, and comes complete with over 70 pages of well-written documentation. (The step-by-step tutorial will have your writing with Telewriter-64 in a matter of minutes.)

To order, send check or money order to:

Cognitec
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Or check your local software store. If you have questions, or would like to order by Visa or Mastercard, call us at (619) 755-1258 (weekdays, 8AM-4PM PST). Dealer inquiries invited.

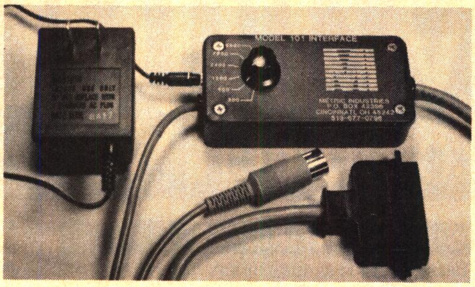
(Add $2 for shipping. Californians add 6% state tax.

Now available at Radio Shack stores via express order

Apple II is a trademark of Apple Computer, Inc.; Atari is a trademark of Atari, Inc.; TRS-80 is a trademark of Tandy Corp; MX-80 is a trademark of Epson America, Inc.

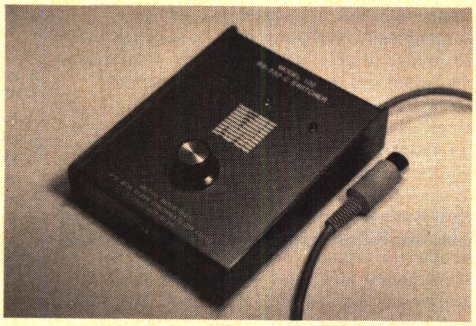
Metric Industries

MODEL 101 INTERFACE ~~54.95~~ 49.50



The Model 101 is a serial to parallel interface intended for use with a COCO and any Centronics compatible parallel input printer. The 101 has 6 switch selectable baud rates (300-9600). It comes with a "UL" listed power supply that can be unplugged from the interface if your printer supplies power (Most do). The 101 is only 4" x 2" x 1" and comes with all cables and connectors for your computer and printer.

MODEL 102 SWITCHER 35.95



The Model 102 has 3 switch positions that allow you to switch your computer's serial output between 3 different devices (modem, printers or another computer). The 102 has color coded lights that indicate the switch position. These lights also act as power indicators to let you know your computer is on. Supplied with the 102 are color coded labels that can be applied to your accessories. The 102 has a heavy guage anodized aluminum cabinet with non-slip rubber feet.

MODEL 103 COMBO ~~85.95~~ 73.50

MODEL 103
SWITCHER INTERFACE COMBO
METRIC INDUSTRIES

With the turn of a knob the model 103 switches your computer's RS232C serial port to any one of 3 outputs — 2 serial and 1 parallel. The serial ports may be used for modems, serial printers or even another computer. The parallel port can be used with any Centronics compatible printer. The 103 has the best features from the 101 and 102: color coded position indicator lights, 6 switch selectable baud rates, heavy anodized aluminum cabinet, "UL" listed power supply and many more.

The Model 101, 102 and 103 will work with any level COCO basic, any memory size 4K-64K and are covered by a 180 day warranty.

The Model 101 and 103 work with any standard parallel input printer including Gemini, Epson, Radio Shack, Gorillia, C.Itoth, Okidata and many others. They support basic print commands, word processors and graphic commands.

CASSETTE LABEL PROGRAM 6.95

CASSETTE LABEL
CASSETTE LABEL PRINTING UTILITY
SIDE ONE
M/L PGM
(C) 1984 METRIC INDUSTRIES

This fancy printing utility prints 5 lines of information on pinfeed cassette labels. "Cassette Label" is menu driven and is very easy to use. It uses the special features of your printer for standard, extended or condensed characters. Each line of text is automatically centered. Before the label is printed, it is shown on your CRT — enabling you to make changes if you like — then print 1, 2 or 100 labels. The program comes on tape and it is supplied with 24 labels to get you started. 16K ECB required.

OTHER ITEMS

High quality 5-screw shell C-10 cassette tapes	**$7.50/dozen**
Hard plastic storage boxes for cassette tapes	**$2.50/dozen**
Pin feed cassette labels	**$3.00/100**

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NEW LOW PRICES

Speaking of Dennis reminds me that he will be giving a seminar at the RAINBOWfest in Princeton, N.J., Oct. 11-13. By now, you have probably seen some other materials for the show, but it certainly isn't too early to get your order for tickets and hotel room in. The reason is simply that our hotels seem to sell out fast these days.

Quite a number of people were disappointed that they were not able to stay at the convention headquarters hotel in Chicago. And the reason was that the hotel sold out all of its rooms!

Yes, I know it is summertime, but take just a minute to pre-register for RAINBOWfest. We'll send you a reservation card and you'll be glad you did.

By way of finally, summer, as many of you know, is traditionally a "moving experience" for many. If you are among those who will be moving this summer, be sure to let us know so we can change your subscription address.

We don't want your subscription to THE RAINBOW to be delayed or missing. And, too, our "Clubs, Clubs, Clubs" section will help you find other members of the CoCo Community in your new home area. Remember, if we don't know you've moved, we can't get your copy of THE RAINBOW to you.

— Lonnie Falk

Hint . . .

Cassette Volume Settings

Although Tandy recommends a volume setting of '5' for their CTR-80 and CCR-81 recorders, we've found that a volume setting of '3' is actually more reliable. (The CCR-82 has a special preset level feature, but you might want to switch it out and set the volume to '3' as well.)

If you don't have a Radio Shack recorder, here's a quick way to set the volume control. Type `AUDIO ON:MOTOR ON` and ENTER, and play a regular audio cassette on your recorder. Adjust the recorder volume so the sound comes through the TV set's speaker without distortion. (If you find this setting doesn't work well, try turning the volume down.)

TOP RATINGS
HOT COCO MAGAZINE
SEPTEMBER 1984

YOU COULD FALL IN LOVE WITH

AUTOTERM!

IT TURNS YOUR COLOR COMPUTER INTO THE

WORLD'S SMARTEST TERMINAL

AND MOST LOVABLE

GOOD LOOKIN'

AUTOTERM shows true upper/lower case in screen widths of 32, 40, 42, 51, or 64 characters with no split words. The width of 32 has extra large letters. Scrolling is forward, backward, and fast. Block graphics pictures are displayed automatically and can be scrolled.

The screen's top line shows operating mode, unused memory size, memory on/off, and caps-lock on/off. It also gives helpful prompts.

SWEET TALKIN'

KEY-BEEP can be on/off. Unacceptable keystrokes cause a lower pitched BOP! This ERROR-BEEBOP can be on/off.

Talks to other computers with Full or Half Duplex; Baud Rate of 110, 150, 300, 600, 1200; Parity as even, odd, mark, space, none; 7 or 8 bit Word; any Stop Bits; all 128 ASCII characters; true line Break; XON/XOFF protocol; and optional line-at-a-time transmission. Able to send and receive text, block graphics, BASIC and ML programs. A 64K machine holds up to 46,600 characters (34,900 in HI-RES).

DUAL PROCESSING lets you review & edit while more data is coming in.

Fully supports D.C. Hayes and other intelligent modems.

Talks to your printer with any page size, margins, line spacing, split word avoidance. Embed your printer's control sequences for boldface, underlining, etc. Narrow text can be automatically spread out.

You'll also use Autoterm for simple word processing and record keeping

You can display directories, delete files, transmit directly from disk, and work with files larger than memory. Easily maintain a disk copy of an entire session.

Compatible with TELEWRITER (ASCII) & other word processors.

SMOOTH WALKIN'

AUTOTERM moves smoothly and quickly between word processing and intelligent terminal action. Create text, correct your typing errors; then connect to the other computer, upload your text, download information, file it, and sign-off; then edit the received data, print it in an attractive format, and/or save it on file.

Editing is super simple with the cursor. Find strings instantly, too! Any operating parameter, such as screen width, can be altered at any time. Uncompleted commands can be cancelled.

PUTTY IN YOUR HANDS

The word processor can be used to create, print, and/or save on file your personal KSMs. They let AUTOTERM act like you. For example, it can dial through your modem, sign-on, interact, perform file operations, & sign-off; an entire session without your help. KSMs can answer the phone, prompt the caller, take messages, save them, hang-up, and wait for the next call. The KSM potential is unbelievable!

NO OTHER COMPUTER IN THE WORLD CAN MATCH YOUR COCO'S AUTOMATIC TERMINAL CAPABILITIES!!!

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"AUTOTERM is the Best of Class."
Graham, *RAINBOW*, 6/83

"The AUTOTERM buffer system is the most sophisticated — and one of the easiest to use..."
Banta, *HOT CoCo*, 9/84

"Almost a full featured word processor..."
Ellers, *RAINBOW*, 11/84

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BUILDING SEPTEMBER'S RAINBOW

"To be, or not to be; that is the question."

Jim Reed, 1985

- *Who's kidding whom, Jim. Those are Bill Shakespeare's words, not yours.*

Shucks, you got me. Perhaps the two most compelling reasons that Shakespeare is so often quoted are that 1) he did have a way with words, but also 2) somebody is bound to call your hand if you try to pass off his words, such as these from *Hamlet*, as your own.

- *Methinks there is CoCo relevancy in this somewhere.*

Yes. One of the thorniest questions we deal with here at THE RAINBOW and her sister publications goes something like this: "How much do I have to alter the program (or subroutine) I based mine on in order to call it my own?" Usually, the answer is "a lot more than you have." Indeed, a better question might be, "How much do I have to put into this program in order to earn a share of the credit?" There's no black and white, but rather a wide gray area to such questions. You can usually feel pretty confident once your concern shifts to whether *someone else will credit your work* or call it their own. Just remember the golden rule.

- *You mean it's simply a matter of conscience?*

Not entirely. You might find yourself in court if someone feels you've encroached on his rights.

- *But, how can you be sure when someone submits something to THE RAINBOW that the work is original?*

Well, we don't do a line by line comparison with every bit of code that's ever been written. Rather, we require an author to sign a contract that stipulates, in part: "Author warrants that the program described herein is his own original work or that he has title to the work. Author agrees that he shall have sole responsibility, at author's expense, for any claims relating to the program or its components, in whole or in part, by others." We like to think our contracts are signed only after due deliberation.

- *Yes, I believe one would think twice before signing that. Obviously, just typing in a program from a listing in THE RAINBOW doesn't make it your own.*

Maybe it's not so obvious. You'd be surprised at how many people seem to think that once they've typed in a listing, it is theirs. Not so; it is still protected by the copyright and is for the single end use of *purchasers* of THE RAINBOW only. If you sell a copy, or even give it away, you are violating the copyright and breaking the law.

- *Now, that brings up a related matter. My CoCo club has a subscription to RAINBOW ON TAPE. So, can I use it in good conscience?*

Use it, yes. Copy it, or portions from it, no. While we encourage clubs to subscribe, in order that members can examine the club copy to decide whether to type in a program or purchase a copy of their own, we do not condone members making copies of our product any more than any of our advertisers would approve of their products being reproduced without permission.

- *What if I download a RAINBOW program from a bulletin board system. Is it mine, then?*

Of course not! The copyright still applies. Almost daily, we get letters saying, "I'm starting up a BBS. Is it OK for me to put RAINBOW programs on my download section?" While we are flattered, we politely, but firmly decline. Ours is a copyrighted, commercial product. I'm reminded of the appliance salesman on TV who proclaims, "I'd like to give them away, but my wife won't let me." Not only do we need to pay the rent here at THE RAINBOW, but we have a responsibility to our authors to preserve the integrity of their copyright. RAINBOW ON TAPE — like the magazine — is for the *individual use* of the purchaser only. With the sole exception of CompuServe, which markets RAINBOW programs through a license from us, no BBS or network should have any RAINBOW programs, of any vintage, available for downloading. We would appreciate information about any abuse of our copyright.

- *In summary, then, while the temptation to copy published software is great and the opportunity is ever present, we must learn to respect the property rights of others.*

Someone before me said it best. In the properly attributed words of Thomas Babington Macaulay, "The measure of a man's real character is what he would do if he knew he would never be found out."

- *Any final comments?*

Well, if everyone subscribed to RAINBOW and its adjunctive RAINBOW ON TAPE, the problem would be solved, wouldn't it? You can quote me on that.

— Jim Reed

DEFT Pascal Workbench

A MUST FOR:

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The College Entrance Examination Board (CEEB) has chosen Pascal for its college advanced placement computer science test. **DEFT Pascal Workbench** provides all the Pascal programming tools you need to prepare for this test on your Color Computer.

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The **DEFT Pascal Workbench** gives you the software you need to do your Pascal programming homework at home on your Color Computer.

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Most of the programming features found on the mainframes and minis used in business and science are available on the Color Computer with **DEFT Pascal Workbench**.

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Has the extensions necessary to quickly do any Color Computer programmming job without giving up execution speed. **DEFT Pascal Workbench** helps you get the job done. Directly access assembler language routines and hardware registers from Pascal.

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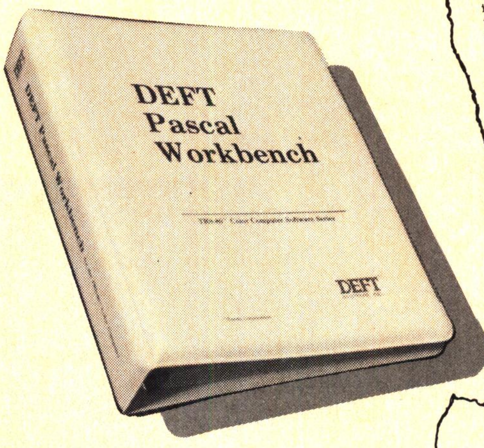

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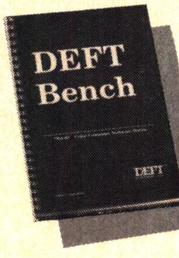

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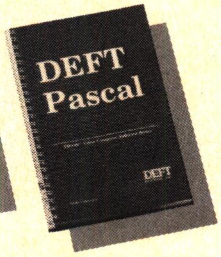

R.E. - San Diego, CA

"In the three months since the purchasing Deft's Workbench, I have become increasingly pleased and impressed with the quality and professional performance of your software, which prompts me to write this letter."
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HOT CoCo Magazine - (March 1985)

"What sets the DEFT product apart is the extent of its coverage. It provides the CoCo user with a very compatible implementation of standard Pascal, along with many useful extensions for string handling, absolute memory access, and the compilation of separate program modules. That's quite a feat for a system that can run on a 32K computer. DEFT's Pascal supports real (that is, floating-point) variables. Many CoCo aftermarket languages handle only integers; this Pascal gives you full-bore computation capability."

RAINBOW Magazine - (November 1984)

"The DEFT Systems people have put together a package which is a complete Pascal and/or assembly programming environment that is reasonably priced and works like a champ."
"DEFT Bench and DEFT Pascal remain an excellent example of what can be accomplished in the CoCo world. The entire package gives you all the necessary tools to learn Pascal. If you already know Pascal, then it gives you a total development environment. Nothing is missing, there is nothing else to buy."
"Any college applicant attempting to obtain advanced credit will be required to know Pascal in order to complete the exam. DEFT Bench and DEFT Pascal provide an excellent learning environment. The entire package is impressive. It is very well-written and extremely easy to use. In all the years I have been looking at software packages, never have I seen so much offered for so little."

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The perfect addition to your **DEFT Pascal** or **DEFT Pascal Workbench**. **DEFT Extra** is a library of gaming and direct file I/O routines with graphics routines that provide Extended Basic's graphics capabilities in all 8 graphics modes. Full **DEFT** quality documentation and sample Paint program included. (requires 64K)

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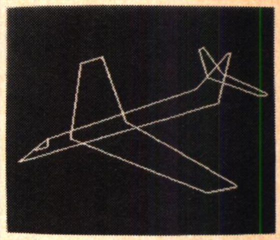

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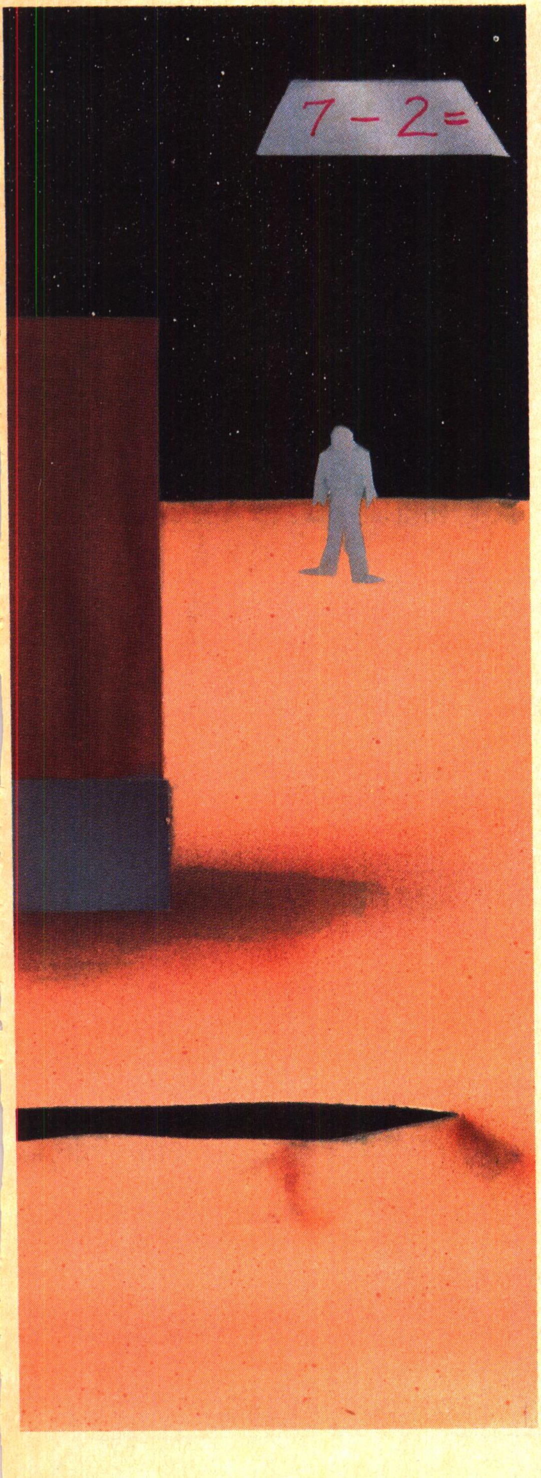
Become A MathWhiz!

(Robo's Depending On It)

By Leonard Hyre



An educational program designed to keep a youngster's interest, *Robomath* allows basic math skills to be learned. By giving the child an exciting and challenging goal (the rescue of "Robo"), the correct answers take on a more important meaning in the student's mind. I have tried to take advantage of the color and sound power of the CoCo to add a more arcade-like presence to the action.

The scenario for *Robomath* is simple. Robo, the friendly robot, is stranded on a strange and desolate planet. Naturally, we all want to aid in his rescue; there is a catch though. The rescue ship must send down fuel for Robo to use to blast off!

The user must provide the correct coordinates in order for the fuel to reach its destination. These are provided by answering the math questions when they are given. A correct answer adds to Robo's fuel supply; an incorrect one results in air being added to the tank. If the air valve reaches the top, the mission is aborted and all fuel is lost. However, a successful mission results in the arrival of a rescue ship and Robo's blasting off to safety.

User options for addition, subtraction, multiplication and division are given for better tailoring to the individual child's level of mathematical progress.

Program Structure

Robomath has some programming features which you may find of interest in your own programming needs. Following is a breakdown of the general flow of the program along with some of the programming methods.

Lines 80, 1020-1390: This section includes a title screen and parental instructions. I have always been a sucker for an entertaining title screen, so I usually put some time and effort into the opener. Using two of CoCo's commands for the main structure, `STRING$` and `PRINT@`, we build the title "Robo" and scroll it into position. These two powerful commands are taken for granted by CoCo owners, while in truth, users of much more expensive machines have nothing to match them!

(Leonard Hyre is the author of Federal Hill Software's Handicapper *series and a number of articles for* RAINBOW. *He also published several articles in* RAINBOW's *sister publication* SOFT SECTOR, *for Sanyo computers, and is the author of* Sanyopoly, *a new Sanyo game from Michigan Software.)*

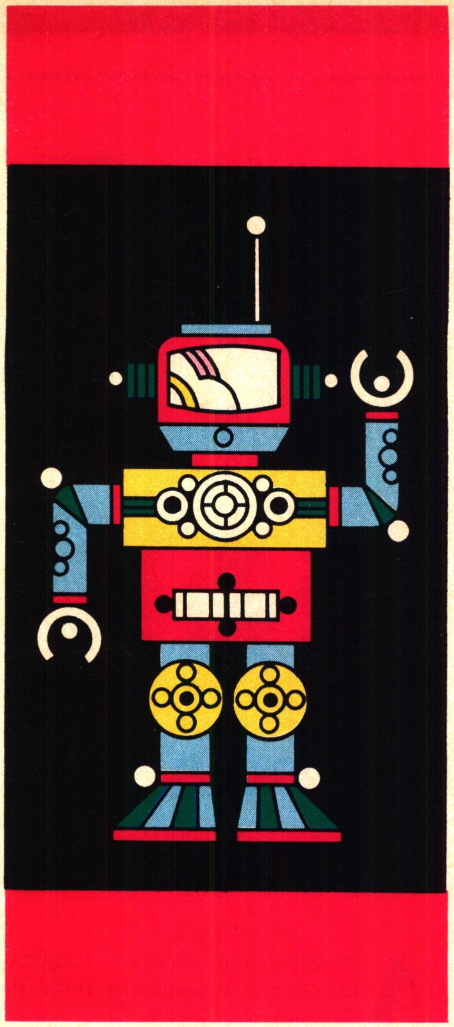
After display of the title, the user is offered an opportunity to receive on-screen instructions. If selected, lines 1310-1390 are used to explain the scenario. If not, the program executes a `RETURN` command to Line 90. Line 90 is then used to call two more subroutines.

Lines 740-1000: Utilizing ECB's `DRAW` command, we set up a series of strings to give *Robomath* the necessary letters and numerics for Hi-Res applications. These strings have been gleaned from my collection of RAINBOW magazines, modified and picked over dozens of times for my own use.

Lines 590-720: Now to the business of drawing the main screen in preparation for play. I like to see a screen ready for action the first time it is shown, so the `SCREEN 1,0` command is saved till just prior to a `RETURN` for action statement. You might want to examine this screen as it is being drawn at various stages. You can do this by adding a temporary line such as:

```
625 SCREEN 1,0
626 GOTO 626
```

This stops the graphics creation at Line 620 for your examination. When done, just `DEL 625-626` and go on. This is a handy way of examining any BASIC program you may wish to learn graphics techniques from.



Lines 105-570: At last! This is the core of the action. Numbers selected at random for the various questions are converted into strings and drawn on the screen as needed. Correct answers send the program to 280, wrong ones to 340. Line 440 checks to see if the mission must be aborted. Lines 480-570 raise the levels of fuel and check to see if the fuel tank is full.

Lines 1520-1522: Mission aborted with only a gentle reminder that "You can't save Robo every time."

Lines 1400-1500: The reward! Robo is saved. A `PMODE 4,1` Hi-Res screen is drawn to depict the successful rescue of Robo. Robo stands alone on the planetary surface sending out his calls for rescue. A saucer-shaped rescue craft arrives, looks on Robo and sends down a tractor beam. Robo is then rocketed off to a happy home, thanks to the efforts of our child math whiz!

A Final Word

I believe *Robomath* will be a valuable software addition to those users looking for educational tools for the family or school.

If you are a reluctant typist or don't have RAINBOW ON TAPE, I will be glad to provide a copy on cassette. Just send $4.50 to me at P.O. Box 403, Cambridge, MD 21613 along with a request for the program.

200	233	1100	85
300	122	1250	5
490	29	1370	254
640	35	1429	126
730	15	1445	196
930	140	END	198

The listing: ROBOMATH

```
10 '*********************
20 '*      ROBOMATH      *
30 '*  COPYRIGHT 1985    *
40 '*   LEONARD HYRE     *
50 '*   CAMBRIDGE MD     *
60 '*********************
70 CLS:FL=185:FW=185:TM=0:TN=0
80 GOSUB 1020
90 GOSUB 740:GOSUB590
100 REM
105 IF MA=4 THEN 271
110 FD=RND(9):SD=RND(9):IF MA=2
THEN SD=RND(FD)
120 FD$=STR$(FD):SD$=STR$(SD)
130 B$=NU$(VAL(FD$))
140 DRAW"BM88,50;C3;S4;XB$;"
150 FOR X=1TO300:NEXT
160 IF MA=1 THEN DRAW"BM113,50;C
3;BR6U12BD6BL6R12"ELSE IF MA=2 T
HEN DRAW"BM113,50;C3;BU6R12"ELSE
 IF MA=3 THEN DRAW"BM113,50;C3;E
12BG6BH6F12"
162 IF MA=1 THEN RA=FD+SD ELSE I
F MA=2 THEN RA=FD-SD ELSE IF MA=
3 THEN RA=FD*SD
170 C$=NU$(VAL(SD$))
180 DRAW"BM138,50;C3;S4;XC$;"
190 DRAW"BM113,62;C4;U2R6D4L3D3B
D2D2
200 A1$=INKEY$:IFA1$=""THEN 200
210 D$=NU$(VAL(A1$)):DRAW"BM96,9
0;C3;XD$;"
212 IF RA<10 THEN A3=VAL(A1$):GO
TO 270
220 A2$=INKEY$:IFA2$=""THEN 220
230 IF A2$=CHR$(13) THEN 250
240 E$=NU$(VAL(A2$)):DRAW"BM116,
90;C3;XE$;"
250 A3$=A1$+A2$:A3=VAL(A3$)
270 IF A3=RA THEN 290 ELSE 350
271 FD=RND(9):SD=RND(9)*FD:IF SD
<10 THEN 271
272 FD$=STR$(FD):SD$=STR$(SD):C1
```

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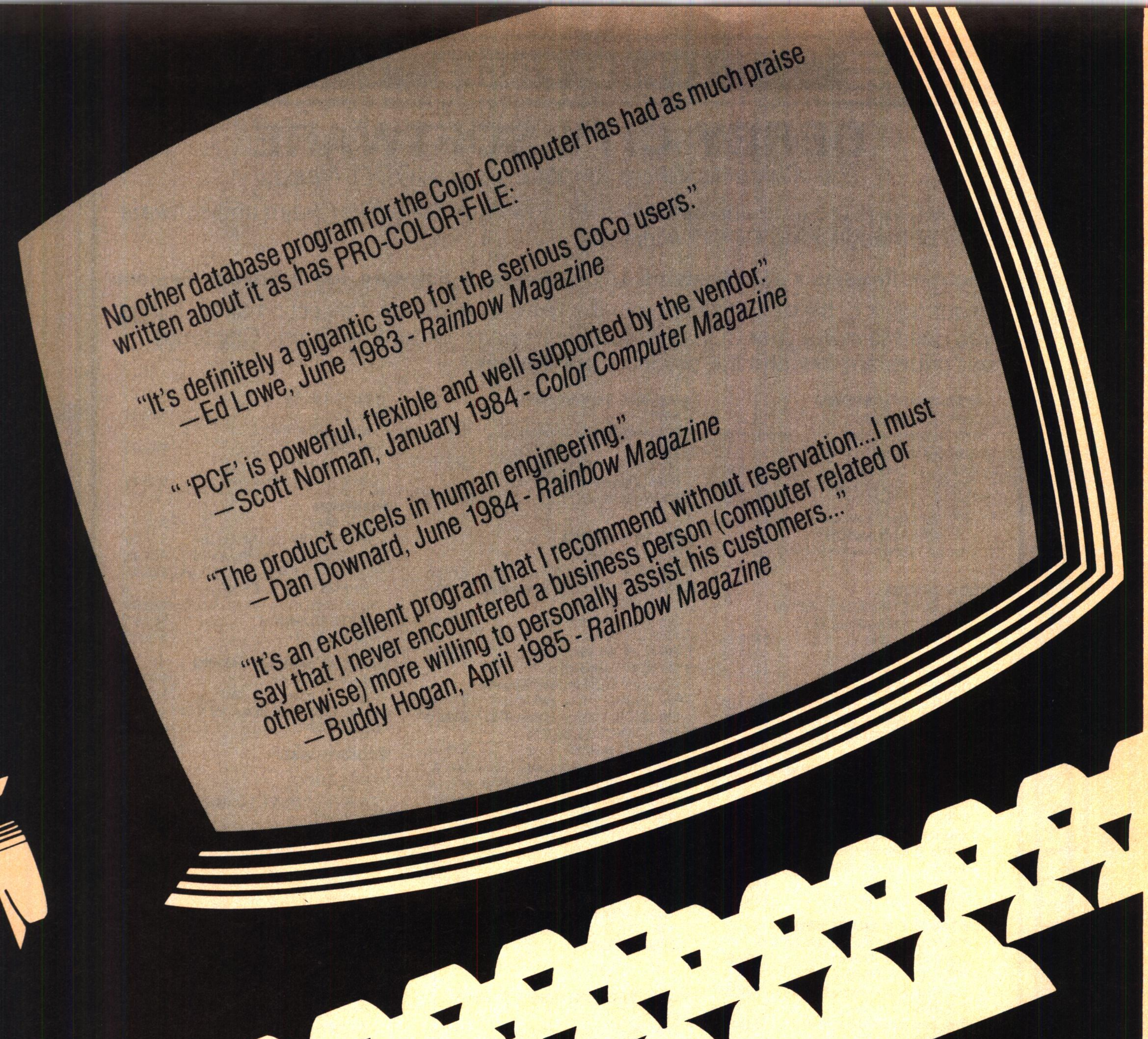

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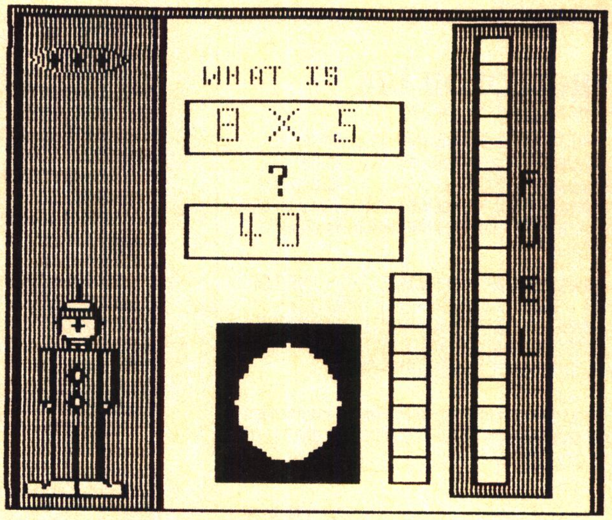
```
$=MID$(SD$,2,1):C2$=MID$(SD$,3,1
)
273 B1$=NU$(VAL(C1$)):B2$=NU$(VA
L(C2$))
274 DRAW"BM80,50;C3;S4;XB1$;":DR
AW"BM96,50;C3;S4;XB2$;"
275 DRAW"BM113,50;BU6R13BU3BL8R2
BD6L2;":C3$=NU$(VAL(FD$)):DRAW"B
M140,50;C3;S4;XC3$;"
276 A1$=INKEY$:IFA1$=""THEN276
277 D$=NU$(VAL(A1$)):DRAW"BM110,
90;C3;XD$;":RA=SD/FD:A1=VAL(A1$)
:IF A1=RA THEN 290 ELSE 350
278 GOTO 278
280 'GOT IT RIGHT
290 DRAW"BM115,155;C3;S4;XXR$;"
300 FORX=1TO3:PLAY"T48V31O5CDEFG
":NEXT X
310 DRAW"BM115,155;C1;XXR$;"
320 FOR T=1 TO 300:NEXT:DRAW"BM3
0,25;C2;D80":FORX=1TO 2:PLAY"O1T
208V31AGAG":NEXT X:DRAW"BM30,25;
C3;D80"
330 GOTO 480
340 'GOT IT WRONG
350 DRAW"BM115,155;C3;BU12D10F2E
2U4BD4F2E2U10"
360 FOR S=1TO3:PLAY"T5V31O1GDGD"
:NEXTS
370 DRAW"BM115,155;C1;BU12D10F2E
2U4BD4F2E2U10"
380 FOR T=1TO300:NEXT
390 TT=RND(3)
400 FOR T=1 TO TT
410 FW=FW-10:IF FW=<100 THEN FW=
100
420 PAINT(167,FW),2,4
430 PLAY"T8O1V31CCC"
440 TN=TN+1:IF TN=8 THEN 1520
450 NEXT T
460 PAINT(85,50),1,4:PAINT(82,77
),1,4
470 GOTO 100
480 PAINT(85,50),1,4:PAINT(82,77
),1,4
490 ZZ=RND(3)
500 FOR T=1 TO ZZ
510 FL=FL-10:IF FL=<10 THEN FL=2
2
520 PAINT(204,FL),4,4
530 PLAY"O5T60V31CCEEGG"
540 TM=TM+1
550 NEXT T
560 IF TM=>17 THEN 1410
570 GOTO 100
580 'DRAW THE SCREEN
590 PMODE3,1:PCLS:LINE(20,130)-(
40,180),PSET,B:LINE(26,130)-(35,
126),PSET,B:CIRCLE(30,120),10:LI
NE(22,115)-(38,115),PSET:LINE(22
,118)-(38,118),PSET:CIRCLE(30,12
1),3:LINE(30,100)-(30,110),PSET
600 LINE(20,130)-(15,150),PSET,B
:LINE(40,130)-(46,150),PSET,B:LI
NE(30,160)-(30,186),PSET:LINE(10
,186)-(50,186),PSET:LINE(15,150)
-(20,156),PSET:LINE(46,150)-(40,
156),PSET:CIRCLE(30,140),5:CIRCL
E(30,150),5:DRAW"BM10,186;C4H1U2
E2R3F2R1E3"
610 DRAW"BM50,186;E1U2H2L3G1L1H3
"
620 PAINT(29,147),2,4:PAINT(17,1
47),2,4:PAINT(43,147),2,4:PAINT(
24,116),2,4
630 LINE(0,0)-(255,191),PSET,B:L
INE(5,3)-(250,191),PSET,B
640 LINE(62,3)-(62,191),PSET,B:L
INE(66,3)-(66,191),PSET:PAINT(64
,10),2,4:PAINT(10,10),3,4:CIRCLE
(30,20),20,2,.25:PAINT(30,20),2,
2:FORX=20 TO 40 STEP10:CIRCLE(X,
20),2:NEXTX
650 LINE(76,35)-(168,55),PSET,B:
LINE(76,75)-(168,95),PSET,B:LINE
(200,10)-(215,180),PSET,B:FORX=2
0 TO 170 STEP10:LINE(200,X)-(215
,X),PSET:NEXTX
660 DRAW"BM84,28;C3;XXW$;XXH$;XX
A$;XXT$;XBL$;XXI$;XXS$;":DRAW"BM
220,70;C4;S6;XXF$;":DRAW"BM220,9
0;C4;S6;XXU$;":DRAW"BM220,110;XX
E$;":DRAW"BM220,130;XXL$;"
670 LINE(190,5)-(232,185),PSET,B
:PAINT(192,7),2,4:PAINT(2,2),2,4
680 CIRCLE(120,150),25:LINE(90,1
20)-(150,180),PSET,B:PAINT(92,12
8),4,4:LINE(165,100)-(180,180),P
SET,B:FORX=110TO170STEP10:LINE(1
65,X)-(180,X),PSET:NEXTX
690 'SHOW THE SCREEN
```



```
700 SCREEN1,0
710 GOTO 100
720 RETURN
730 'LEARN THE ALPHABET
740 XA$="BM+1,0U4E2R1F2D4BL3BU2R
2BD2BR3"
750 XB$="BM+2,0U6BL1R3F1D1G1L1R1
F1D1G1L3BR7"
760 XE$="BM+5,0L4U6R4BD3BL2L1BD3
BR6"
770 XF$="BM+1,0U6R4BD3BL2L1BD3BR
6"
780 XH$="BM+1,0U6BR4D6BL3BU3R3BR
4BD3"
790 XI$="BM+5,-6L4R2D6L2R4BR3"
800 XL$="BM+1,-6D6R4BR3"
810 XO$="BM+5,-1U4H1L2G1D4F1R2BR
4"
820 XR$="BM+1,0U12R7D6L7R2F6"
830 XS$="BM+1,-1FU1BD1R3U3L4U3R4
D1
840 XT$="BM+3,0U6L3R6BR2BD6"
850 XU$="BM+1,-6D5F1R2E1U5BD6BR3
"
860 XW$="BM+1,-6D6R1E2U1D1F2R1U6
D6BR3"
870 XY$="BM+1,-6D1F2D3U3E2U1BD6B
R2"
880 BL$="BM+1,0BR7"
890 'LEARN THE NUMBERS
900 NU$(1)="BM+4,0R4BL2U12G2"
910 NU$(2)="BM+1,0BU10U2R8D5L8D7
R8"
920 NU$(3)="BM+1,0BU2D2R8U6L4BR4
U6L8D2"
930 NU$(4)="BM+4,0BU4U8BD8R8BL3B
U8D12"
940 NU$(5)="BM+2,0BU2D2R8U6L6U6R
6"
950 NU$(6)="BM+3,0R8U5L8BD5U12"
960 NU$(7)="BM+4,0BU12R8D4G8"
970 NU$(8)="BM+2,0U12R8D6L6BR6D6
L8"
980 NU$(9)="BM+2,0U2BD2R8U12L8D6
R8"
990 NU$(0)="BM+0,0U12R8D12L8"
1000 RETURN
1010 'SET UP TITLE SCREEN
1020 CLS0:PR=226:PX=32:SS=100
1030 X$=CHR$(159):Y$=CHR$(128)
1040 X1$=STRING$(6,X$):Y1$=STRIN
G$(4,Y$)
1050 BG$=X$+Y1$+X$+Y$+X$+Y1$+X$+
Y$+X$+Y1$+X$+Y$+X$+Y1$+X$
1060 FOR TI=1 TO 7
1070 PRINT@PR,X1$+Y$+X1$+Y$+X1$+
Y$+X1$;
1080 PRINT@PR+PX,BG$;:PRINT@PR+2
*PX,BG$;:PRINT@PR+3*PX,X1$+Y$+X$
+Y1$+X$+Y$+X1$+Y$+X$+Y1$+X$;
1090 PRINT@PR+4*PX,BG$;:PRINT@PR
+5*PX,BG$;
1100 PRINT@PR+PX*6,X$+Y1$+X$+Y$+
X1$+Y$+X1$+Y$+X1$;
1110 PRINT@PR+3*PX+5,CHR$(154);:
PRINT@PR+3*PX+19,CHR$(154);
1120 PRINT@PR+PX*7,STRING$(32,12
8);
1130 SOUND SS,1:SS=SS+15
1140 PR=PR-32
1150 NEXT TI
1160 PRINT@328,"by"+CHR$(128)+"l
eonard"+CHR$(128)+"hyre";
1170 FOR T=1TO100:NEXT
1180 FOR SS=1 TO 10:PLAY"O5V31T2
00CG":NEXT
1190 FOR T=1 TO 400:NEXT:PLAY"T2
03L16CP16O2L32GP32GP32L8AGP9L16B
P16O3C"
1200 FOR T=1 TO 100:NEXT:CLS2:PR
INTSTRING$(64,175);
1210 PRINTSTRING$(13,175)+CHR$(1
28)+"robo"+CHR$(128)+STRING$(45,
175);
1220 PRINTCHR$(175)+" TAKE YOUR
PICK-SPACE CADET    "+CHR$(175);:
PRINTSTRING$(32,175);:PRINT"
```

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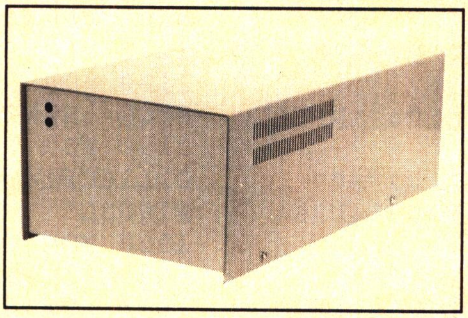

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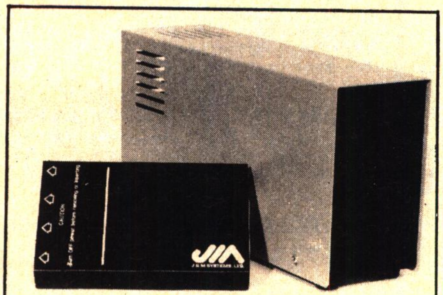

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```
     1> ADDITION":PRINT"
   2> SUBTRACTION":PRINT"
   3> MULTIPLICATION":PRINT"
     4> DIVIDE      ":PRINT"
     5> instructions"
1230 PRINTSTRING$(96,175);
1240 PRINT"ENTER 1, 2, 3, 4 OR 5
..........";
1250 A$=INKEY$:IFA$=""THEN 1250
1260 MA=VAL(A$):IF MA=<0 OR MA>5
 THEN SOUND1,4:GOTO 1250
1270 IF MA=5 THEN 1320
1280 PRINT@488,"one minute pleas
e";
1290 SOUND 100,1:SOUND 150,1:SOU
ND 125,1
1300 RETURN
1310 'HOW TO PLAY
1320 CLS:PRINTSTRING$(32,149);:P
RINT@46,"ROBO"
1330 PRINTSTRING$(32,149);
1340 PRINT"robo- THE FRIENDLY CO
CO ROBOT   HAS BEEN STRANDED BY
ACCIDENT ONA STRANGE PLANET. you
r  MISSION IS TO RESCUE HIM!"
1350 PRINT"YOU FIGURE OUT THE AN
SWERS  FOR THE MATH PROBLEMS SHO
WN.FOR EACHONE CORRECT ROBO'S SH
IP SENDS   DOWN A FUEL CANISTER.
  FILL  THEFUEL TANK AND SAVE ro
bo.";
1360 PRINT"BUT--be careful--WRON
G ANSWERS  FILL UP THE AIR TANK
AND IF IT GETS FULLALL FUEL IS L
OST!  ";
1370 PRINT" <enter key>";
1380 A$=INKEY$:IFA$=""THEN 1380
1390 GOTO 10
1400 'RESCUE ACCOMPLISHED
1410 SCREEN0,0:CLS0:FOR X=1 TO 3
:PLAY"V31T70O2CEO3CEO4CEO5CE":NE
XTX
1420 PRINT@104,"into"+CHR$(128)+
"hyperspace";:PMODE 4,1:PCLS0
1425 FOR ST=1TO30:O=RND(255):D=R
ND(180):PSET(O,D):NEXT:LINE(0,18
0)-(25,170),PSET:LINE-(45,184),P
SET:LINE-(60,178),PSET:LINE-(85,
184),PSET:LINE-(100,175),PSET:LI
NE-(120,180),PSET:LINE-(140,180)
,PSET:LINE-(160,170),PSET
1426 LINE-(185,182),PSET:LINE-(2
05,174),PSET:LINE-(220,185),PSET
:LINE-(255,176),PSET:PAINT(2,189
),1,1:SCREEN1,1:FORT=1TO300:NEXT
1427 LINE(128,180)-(132,170),PSE
T,BF:LINE(130,168)-(130,170),PSE
T:LINE(128,168)-(132,166),PSET,B
F:LINE(129,167)-(131,167),PRESET
:LINE(130,175)-(130,180),PRESET:
LINE(126,172)-(134,172),PSET
1428 FORXG=1TO3:FOR SG=1 TO 3:LI
NE(130,165)-(120,140),PSET:LINE(
130,165)-(140,140),PSET:PLAY"V31
T200O5GCP2GC":LINE(130,165)-(120
,140),PRESET:LINE(130,165)-(140,
140),PRESET:NEXTSG:FORT=1TO100:N
EXT:NEXTXG
1429 XX=10
1430 FORMV=1TO8:CIRCLE(XX,40),12
,1,.25:PLAY"V31T255L255O4CO5BG":
CIRCLE(XX,40),12,0,.25:XX=XX+15:
NEXT MV:CIRCLE(XX,40),12,1,.25
1431 FORTI=1TO3:FORSG=1TO3:LINE(
XX,44)-(XX,140),PSET:PLAY"T255O5
GCGC":LINE(XX,44)-(XX,140),PRESE
T:NEXT SG:NEXTTI
1432 LINE(XX-2,45)-(XX+2,165),PS
ET,BF:FORT=1TO100:NEXT
1433 LINE(XX-4,165)-(XX+4,180),P
RESET,BF:PLAY"O3T50CDEFG":Z=1
1434 FOR UP=165 TO 65 STEP-20:LI
NE(XX-2,UP)-(XX+2,UP-20),PRESET,
BF:SOUND Z,1:Z=Z+20:NEXT UP
1444 LINE(XX+2,40)-(XX+25,40),PS
ET:CIRCLE(XX,40),12,0,.25:LINE(X
X-80,40)-(XX-6,40),PSET:CIRCLE(X
```

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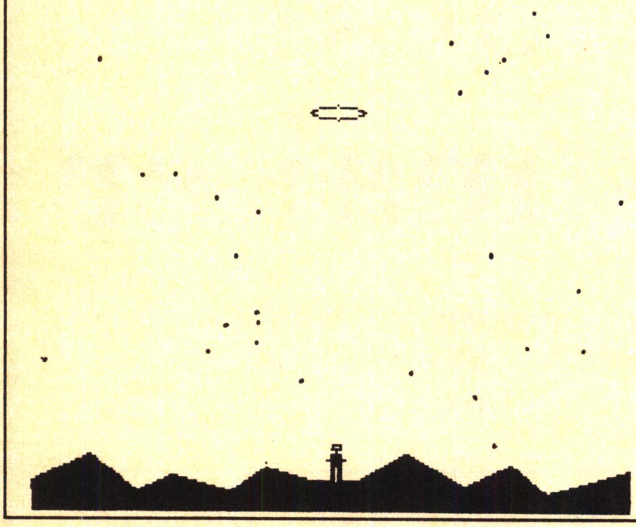
```
X-86,40),12,1,.25:PLAY"T100V31O5
GCO4GCO3GCO2GC":LINE(XX+25,40)-(
XX-80,40),PRESET:CIRCLE(XX-86,40
),12,0,.25
1445 DRAW"BM70,100;U10BD5R8BU5D1
0BR4U10R8BD5L8BD5R8BR4BU10D2BD3B
R4BU1U2BD8U2BD2R8U5L8U5R8D2BD8BR
40BU2D2R8U5L8U5R8D2BD8BR4U10R8D5
```



```
L8BR8D5BR8U10R8BD5L8BR8BD5BR6U10
R8BD5L8BD5R8"
1446 FORSD=1TO12:PLAY"T180V31O3C
FO4CFO5CFFCO4FDO3FC":NEXTSD:FORX
=1TO400:NEXT
1480 CLS2:PRINT@32,STRING$(32,15
9);:PRINT@64,"              YOU DI
D IT!           ";:PRINT@288,"  WA
NT TO TRY AGAIN    <Y OR N> ";
1490 A$=INKEY$:IF A$=""THEN 1490
1500 IF LEFT$(A$,1)="Y"THEN 10 E
LSE END
1510 'SORRY-TRY AGAIN
1520 FOR T=1TO15:PLAY"V31T100O1C
DEFGO2AB":NEXT T:PRINT:PRINT
1522 CLS2:PRINTSTRING$(32,183):P
RINT@64,"                  so"+CHR$(1
28)+"sorry";:PRINT:FORTI=1TO150:
NEXT:PRINTSTRING$(32,183);:PRINT
@128,"YOU CAN'T SAVE 'ROBO' EVER
YTIME!":PRINTSTRING$(32,183);
1550 PRINT@161,"WILL YOU TRY AGA
IN  <Y OR N>  ";:PRINT@448,STRIN
G$(32,183);
1560 A$=INKEY$:IFA$=""THEN 1560
1570 IF LEFT$(A$,1)="Y"THEN 10 E
LSE END
```

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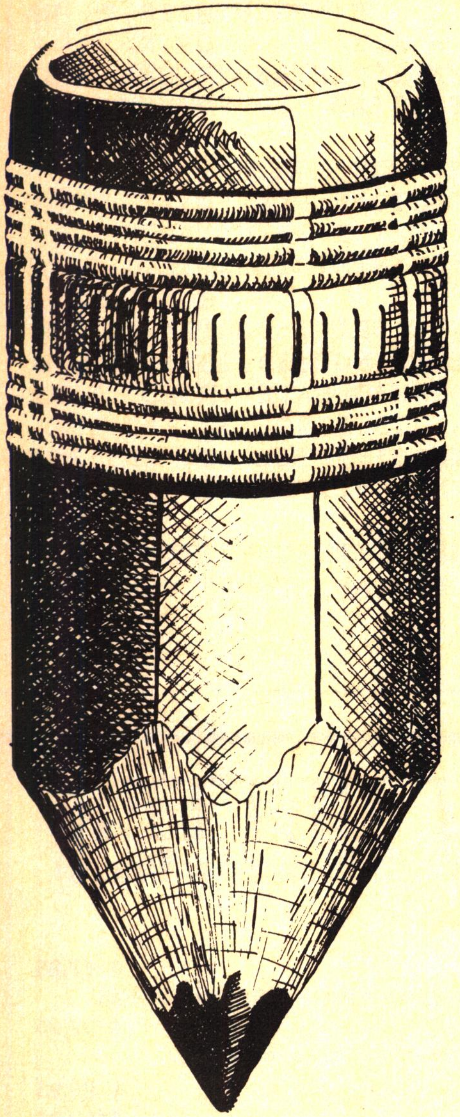

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A test-writing program for true and false, multiple-choice, fill-in-the-blank and matching tests.

By Lynn C. Sherman and Walter Baldassaro

All students have one thing in common: They hate to take tests. Teachers likewise have one thing in common: They hate writing and correcting those test papers. The CoCo may not be ready to help in the laborious task of grading tests, but it is most helpful in writing test papers. *CoCo Testmaker* is not limited to use by teachers. Concerned parents will find it a perfect way to help their children study, check what they have learned and, in turn, learn how to take written tests. When it comes to formatting the test, typing the lines for essay-type answers and shuffling the choices in matching lists, *CoCo Testmaker* gets an A+!

When using this program the teacher has a six-entry menu from which to work. This allows for greater flexibility, and makes it possible to make two tests using the same questions but in a different section order. This helps cut down on the temptation of wandering student eyes. Each group of questions is automatically numbered. The test paper heading is placed on the top right-hand corner of the paper to aid in sorting through stacks of test papers.

Prior to typing the questions in, each section of the program prints out a line of instructions for the student. True and false questions ask for one of these words to be circled, as does the correct choice in the multiple-choice questions. Fill in the

(Lynn Sherman is a lieutenant in the Jefferson Parish Sheriff's Office; Walter Baldassaro is a superintendent for a contracting company. They originally bought their CoCos for the purpose of assisting their wives, who are teachers, with school records and grades. This program is a result of their efforts.)

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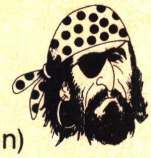

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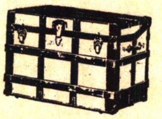

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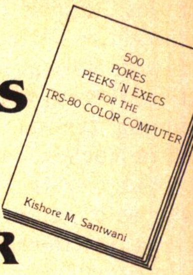

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blank entries are self-explanatory. Number four on the menu, "Answer Questions," allows for both objective and subjective testing. Up to four lines can be automatically printed under the question, thereby eliminating the time-consuming typing task normally required of teachers compiling tests.

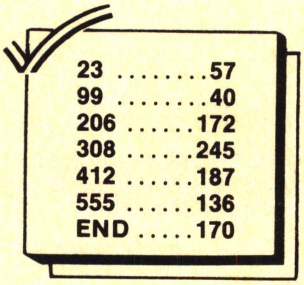
Matching tests have always been popular with teachers and students. By matching statements in one column with information in another column, the students can use comparison of choices and the process of elimination. For the teacher it is a quick grading type of test, which is important when there are up to 200 papers to be corrected for the next day. *CoCo Testmaker* permits the teacher to enter, for example, states in one column and capitals in the other. Shuffling the information is done by lines 600-695. Different patterns of jumbling this information can be accomplished by editing this section of the program.

CoCo Testmaker is designed to be very "teacher friendly." The goal was to cut down on the time it took to write and type up test papers. With the advent of plain paper copy machines as the way tests are mass printed, it was only natural that the CoCo would replace the typewriter/mimeograph machine connection. Automatic numbering, columning, shuffling and the printing of lines for students to write on have cut the time of this task in half.

As mentioned earlier, *CoCo Testmaker* can be used as a home study aid as well. Teaching the youngest students how to take these types of written tests will give them a definite advantage throughout their entire school years. Reviewing studied homework via a homemade test should help any student, no matter what the grade level. Taking written tests is just like everything else in life — practice makes perfect!

This program was written for 16K, but can be expanded in several areas if the user has a larger memory machine. By altering lines 420-425, additional lines can be printed to allow for longer essay answers. As indicated in Line 546, only 10 matching entries can be made. If more are desired, additions would have to be made to the 600-622 series, and to the 650-695 series. It should be noted that due to the placement of the columns on the page, there are limits to the number of characters in each column. There can be a maximum of 27 characters in Column A and 45 in Column B.

On a non-programming topic, the authors offer a test-scoring technique suggestion. Take an extra copy of the test to be graded and cut out the incorrect answers on the objective questions. By laying this cut-out test sheet on the test to be graded, only the wrong answers have to be marked for scoring. This quick method of scoring has a number of modifications available, and cuts down the time it takes the teacher to read the subjective answers and total up the final grade.



23	57
99	40
206	172
308	245
412	187
555	136
END	170

The listing: TESTMAKR

```
1 REM ---------------------COCO
TESTER -------------------------
-----------
2 REM ///     A TEST MAKING PROGR
AM BY W. BALDASSARO & L.C. SHERM
AN        ///
3 REM ///                        C
OPYRIGHT 1985
        ///
4 REM FD-DD+C-CC+B-BB+A-AA+ / FD
-DD+C-CC+B-BB+A-AA+ / FD-DD+C-CC
+B-BB+A-AA+
5 CLS
6 CLEAR 2000
8 GOTO25
9 CLS : INPUT "DATE OF TEST";O$
10 PRINT#-2,"
NAME-----------------------":PR
INT#-2,""
20 PRINT#-2,"
HOMEROOM-------------------":PR
INT#-2,""
22 PRINT#-2,"
DATE   "+O$:PRINT#-2,""
23 CLS : GOTO 40
25 PRINT "  YOUR COMPUTER IS NOW
 YOUR      TEACHER'S AID AND WILL
 ASSIST    YOU IN MAKING UP A TES
T.  MAKE   SURE THE PAPER IN YOUR
 PRINTER   IS SET TO THE TOP OF T
HE PAGE.                        "
26 PRINT "  PRESS ANY KEY TO BRI
NG UP THE MENU OF TYPES OF QUEST
IONS       OFFERED."ZZZ$
27 INPUT ZZ$
32 CLS
40 PRINT "WHICH WOULD YOU PREFER
"
50 INPUT"   1 PRINT HEADING ON
              PAPER
            2 MULTIPLE CHOICE
            3 FILL IN THE BLANK
            4 ANSWER QUESTIONS
            5 TRUE FALSE TEST
            6 MATCHING TEST ";N
70 IF N <1 OR N >6 THEN50
80 ON N GOSUB 9, 200, 300, 400,
   90, 530
```

```
90 PRINT#-2,"CIRCLE TRUE IF THE
STATEMENT IS TRUE--CIRCLE FALSE
IF THE STATEMENT IS FALSE":PRINT
#-2,""
95 CLS
96 J=0
98 PRINT "TRUE OR FALSE QUESTION
S"
99 PRINT"AFTER TWO LINES RETURN
TO ARROW (^)"
100 PRINT"                    ^"
110.INPUT"";A$
120 B$="TRUE OR FALSE "
151 Q$="  "
156 J1=1
157 J=J1+J
160 PRINT#-2,J;B$;Q$;A$:PRINT#-2
,""
166 GOTO 100
180 END
200 PRINT#-2,"CIRCLE THE BEST AN
D MOST CORRECT ANSWER FOR EACH S
TATEMENT "
201 J=0
202 CLS
204 PRINT "TYPE STATEMENT OR QUE
STION      WHEN FINISHED SELECTI
ONS WILL   APPEAR A-B-C-D
           THEN TYPE IN YOUR SEL
ECTIONS.   WHEN FINISHED ALL STA
TEMENTS OR QUESTIONS IN A SECTIO
N PRESS    <BREAK-RUN> FOR MENU
AGAIN""
205 PRINT"THIS SECTION WILL ACCE
PT TWO    LINES  DO NOT RETURN P
AST  FIRST ARROW(^) THEN  SPACE
TO NEXT   ARROW (^)":PRINT"

      ^      ^"
206 INPUT"";C$
207 CLS
208 J1=1:J=J1+J
210 PRINT#-2,"":PRINT#-2,J;TAB(5
)C$:PRINT#-2,""
215 C2$="A.":C3$="B.":C4$="C.":C
5$="D.":C6$="E."
220 INPUT "A";A$:INPUT "B";B$:IN
PUT "C";C$:INPUT "D";D$
225 INPUT "DO YOU NEED E, Y/N ";
EE$
230 IF EE$="Y" THEN 250 ELSE 240
240 PRINT#-2,TAB(10)C2$+A$:PRINT
#-2,TAB(10)C3$+B$:PRINT#-2,TAB(1
0)C4$+C$:PRINT#-2,TAB(10)C5$+D$
245 GOTO 205
250 INPUT "E";E$
```

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By Bernie Litton

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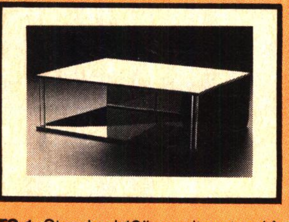

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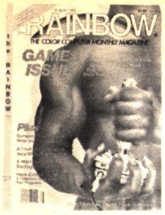

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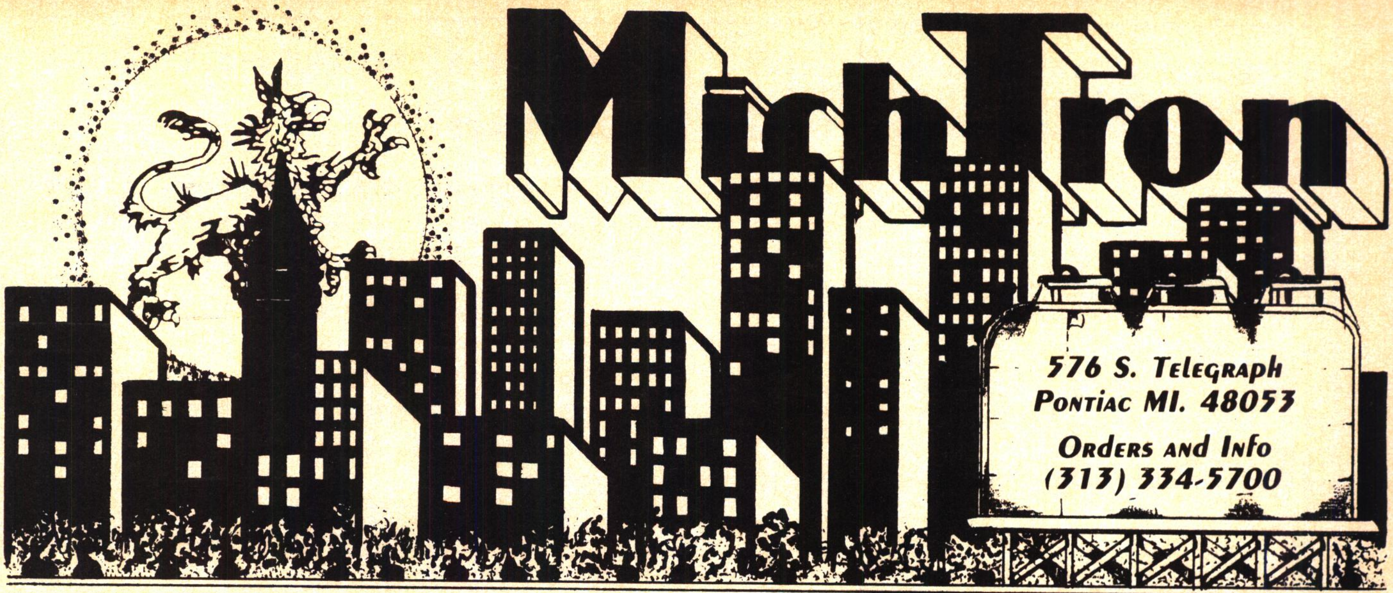

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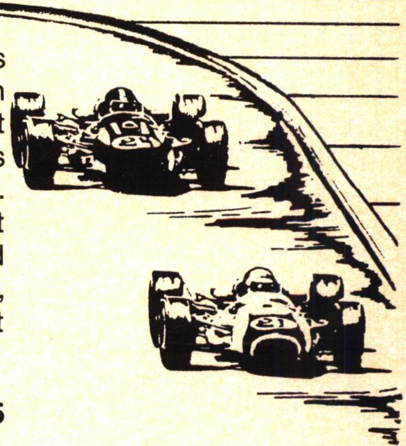
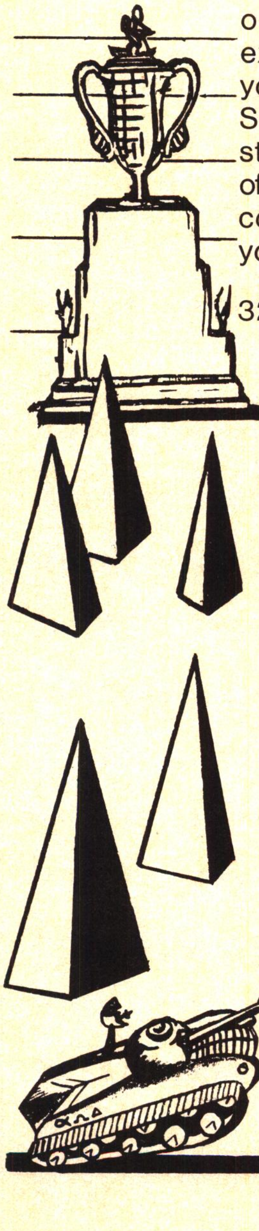
SPEED RACER

by Steven Hirsch



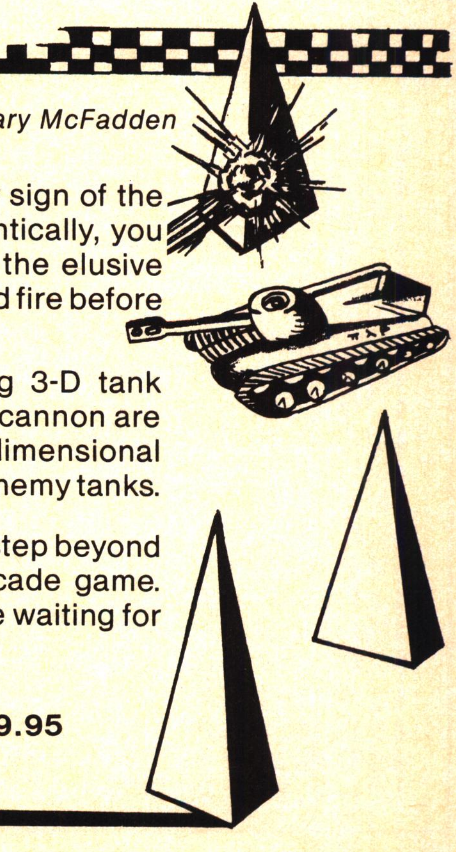
The checkered flag drops as your pulse rises in this lively new arcade game. The road twists to the horizon on the 3-D panorama that sets the stage for the most exciting race the CoCo has ever seen! Vie for time as you speed through the curves at incredible speeds. Step through the gears to stay ahead of the pack, but step lively since some will stop at nothing to see the end of the race, or the end of you! Four challenging raceways, complete with obstacles and colorful 3-D scenery, put your skills to the test in this Pole Position™ type game.

32K Color Computer Required. **$34.95**



ROMMEL 3-D

By Kary McFadden



You clutch the tank controls, searching for any sign of the enemy. Suddenly a blip appears on radar! Frantically, you move your tank into position. At last you spot the elusive enemy tank! Facing it, you race to lock sights and fire before he does!

Enter the ultimate battle-zone in this exciting 3-D tank combat game. Strategy, speed, and your tank's cannon are your only hope as you wind through a three-dimensional course inhabited by impenetrable barriers and enemy tanks.

Dazzling graphics and lifelike sound take you a step beyond the ordinary in this fast, machine-language arcade game. Enter the next dimension, ROMMEL's troops are waiting for you!

32K Color Computer Required. **$29.95**

```
255 PRINT#-2,TAB(10)C2$+A$:PRINT
#-2,TAB(10)C3$+B$:PRINT#-2,TAB(1
0)C4$+C$:PRINT#-2,TAB(10)C5$+D$:
PRINT#-2,TAB(10)C6$+E$
260 GOTO 205
300 CLS
305 PRINT#-2,"FILL IN THE BLANKS
 OF EACH STATEMENTS.":PRINT#-2,"
"
307 PRINT"THIS SECTION WILL ACCE
PT TWO    LINES  DO NOT RETURN P
AST  ARROW ^ THEN PRESS ENTER TO
 CONTINUE   LINE"
308 PRINT"STATEMENT OR QUESTION

                     ^      "
310 INPUT"";F$
312 J1=1
314 J=J1+J
315 PRINT#-2,J;F$: PRINT#-2,""
316 INPUT "PRESS 1 FOR SPACE IF
NEEDED";A : ON A GOSUB 340
330 GOTO 308
340 INPUT" ";AA$
350 PRINT#-2,TAB(3)AA$:PRINT#-2,
""
355 GOTO 308
400 CLS
402 PRINT#-2,"ANSWER QUESTIONS O
N LINES PROVIDED":PRINT#-2,""
404 PRINT"THIS SECTION WILL ACCE
PT TWO    LINES  DO NOT RETURN P
AST FIRST ^  SPACE TO NEXT ARROW
 ^"
405 PRINT"

                     ^      ^":I
NPUT"";Y$
410 YY$="-----------------------
--------------------------------
-----------------"
412 J1=1
414 J=J1+J
415 PRINT#-2,J;Y$:PRINT#-2,""
420 INPUT "HOW MANY LINES 1-2-3-
4 ";H
425 ON H GOSUB 430, 440, 450,460
430 PRINT#-2,YY$:PRINT#-2,""
435 GOTO 405
440 PRINT#-2,YY$:PRINT#-2,"":PRI
NT#-2,YY$:PRINT#-2,""
445 GOTO 405
450 PRINT#-2,YY$:PRINT#-2,"":PRI
NT#-2,YY$:PRINT#-2,"":PRINT#-2,Y
Y$:PRINT#-2,""
455 GOTO 405
460 PRINT#-2,YY$:PRINT#-2,"":PRI
NT#-2,YY$:PRINT#-2,"":PRINT#-2,Y
Y$:PRINT#-2,"":PRINT#-2,YY$:PRIN
T#-2,""
465 GOTO405
466 END
530 PRINT#-2,"MATCH COLUMN A WIT
H COLUMN B.   PLACE NUMBER OF CO
LUMN B IN SPACE PROVIDED IN
                              CO
LUMN A":PRINT#-2,""
545 CLS
546 PRINT"THIS SECTION WILL RAND
OM 10       ITEMS IN COLUMN A WIT
H 10 ITEMS IN COLUMN B.":PRINT,"
":PRINT,""
555 PRINT"INPUT COLUMN A AND COL
UMN B     RANDOMING IS AUTOMATIC
 .":PRINT,""
558 PRINT"COLUMN A. CAN BE UP TO
                    27 CHARACTER
S LONG.   COLUMN B. CAN BE UP TO
                    45 CHARACTER
S LONG."
560 L2$="---"
565 PRINT#-2,"COLUMN A.
            COLUMN B.":PRINT#-2
,""
600 INPUT"A.";Z6$:INPUT"B.";Q$
604 INPUT "A.";Z5$:INPUT"B.";Q3$
608 INPUT "A.";Z4$:INPUT"B.";Q2$
610 INPUT "A.";Z3$:INPUT"B.";Q4$
612 INPUT "A.";Z2$:INPUT"B.";Q5$
614 INPUT "A.";T2$:INPUT"B.";P2$
616 INPUT "A.";T3$:INPUT"B.";P3$
618 INPUT "A.";T4$:INPUT"B.";P4$
620 INPUT "A.";T5$:INPUT"B.";P5$
622 INPUT "A.";T6$:INPUT"B.";P6$
630 J=0 :J1=1 :J=J1+J
650 PRINT#-2,L2$+Z5$;TAB(30)J;Q2
$:PRINT#-2,"":J=J1+J
655 PRINT#-2,L2$+Z6$;TAB(30)J;Q3
$:PRINT#-2,"":J=J1+J
660 PRINT#-2,L2$+Z3$;TAB(30)J;P4
$:PRINT#-2,"":J=J1+J
665 PRINT#-2,L2$+Z2$;TAB(30)J;Q$
:PRINT#-2,"":J=J1+J
670 PRINT#-2,L2$+Z4$;TAB(30)J;Q5
$:PRINT#-2,"":J=J1+J
675 PRINT#-2,L2$+T2$;TAB(30)J;P5
$:PRINT#-2,"":J=J1+J
680 PRINT#-2,L2$+T5$;TAB(30)J;P3
$:PRINT#-2,"":J=J1+J
685 PRINT#-2,L2$+T4$;TAB(30)J;P6
$:PRINT#-2,"":J=J1+J
690 PRINT#-2,L2$+T6$;TAB(30)J;Q4
$:PRINT#-2,"":J=J1+J
695 PRINT#-2,L2$+T3$;TAB(30)J;P2
$:PRINT#-2,"":J=J1+J
700 END
```

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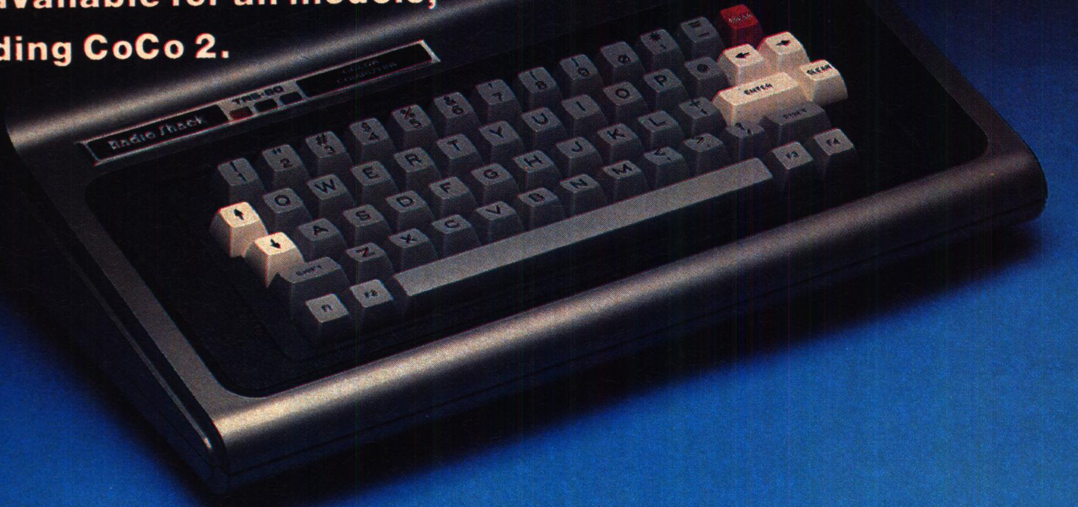

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If you've been thinking about spending good money on a new keyboard for your Color Computer, why not get a good keyboard for your money?

Designed from scratch, the HJL-57 Professional Keyboard is built to unlock ALL the potential performance of your Color Computer. Now, you can do real word processing and sail through lengthy listings...with maximum speed; minimum errors.

At $79.95, the HJL-57 is reasonably priced, but you can find other CoCo keyboards for a few dollars less. So, before you buy, we suggest that you compare.

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The ergonomically-superior HJL-57 has sculptured, low profile keycaps; and the three-color layout is identical to the original CoCo keyboard.

Compare Construction.

The HJL-57 has a rigidized aluminum baseplate for solid, no-flex mounting. Switch contacts are rated for 100 million cycles minimum, and covered by a spill-proof membrane.

Compare Performance.

Offering more than full-travel, bounce-proof keyswitches, the HJL-57 has RFI/EMI shielding that eliminates irritating noise on displays; and four user-definable function keys (one latchable), specially-positioned to avoid inadvertent actuation.

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Carefully engineered for easy installation, the HJL-57 requires no soldering, drilling or gluing. Simply plug it in and drop it right on the original CoCo mounting posts. Kit includes a new bezel for a totally finished conversion.

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Only $79.95, the HJL-57 is available for immediate shipment for either the original Color Computer (sold prior to October, 1982) or the F-version and TDP-100 (introduced in October, 1982), and the new 64K CoCo. **Now also available for CoCo 2.**

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16K
ECB

Keeping The Communication Lines Open

This informative program demonstrates some of the manual signs and gestures used in sign language.

By Bill Bernico

Computers have already come to mean a lot to the handicapped. They are frequently being used by people who have no other way to communicate with the rest of the world. Computers and computer programs have made their lives easier and have helped them to reach out to us. Now we can reach out to some of them by familiarizing ourselves with sign language, the form of communication used by the deaf.

Sign language is made up of different configurations of the hands to spell out letters, words and phrases. The overall process of sign language involves much more than is presented here, but this program may spark your interest enough to continue on and learn more.

Rainbow Hand Sign simply spells out the word "rainbow" one letter at a time using sign language. Each letter is made up of `DRAW`, `LINE` and `CIRCLE` commands, and is presented in graphics

(Bill Bernico is a self-taught computerist who enjoys programming, golf, TV and music. He has played with a '60s rock band for 18 years.)

form. Memory permitting, a person could do the entire deaf alphabet and a fairly good-sized collection of words and phrases using this technique.

Upon running the program, the opening page will inform you that you can delay the length of time each picture is on the screen by simply changing the delay values in those lines that contain the phrase `FOR X= 1 TO 750:NEXT X`. There are more complicated ways of customizing the speed option here, but I wanted to keep it as simple as possible.

Rainbow Hand Sign was actually trimmed down from a program I wrote called *Hand Sign*. It presented the entire sign language alphabet and the user could call up any letter and see it displayed simply by pressing the appropriate key. Due to the length of the original *Hand Sign*, it will not be included with this article. However, it will be added to this month's RAINBOW ON TAPE following the *Rainbow Hand Sign* program listing.

(For anyone having questions concerning this program, you can write to Mr. Bernico at 708 Michigan Avenue, Sheboygan, WI 53081. Please include a SASE.)

Caution — Packed Lines!!

Some of the lines in this program may be too long to enter in a normal fashion. If the CoCo stops accepting characters, press ENTER, go into the EDIT mode, press 'X' and then type the rest of the line in.

200	36
270	29
340	252
400	142
END	113

The listing: `RAINSIGN`

```
10 'SPELL OUT "RAINBOW" IN SIGN
    LANGUAGE
20 'BY BILL BERNICO
30 '708 MICHIGAN AVE.
40 'SHEBOYGAN, WI 53081
50 CLS:PRINT@12,"rainbow"
60 PRINT@40,"IN SIGN-LANGUAGE
70 PRINT@164,"TO VIEW LONGER OR
SHORTER,       CHANGE TIME DELAY
VALUES         IN LINES 220,270,3
10,350,        400,440, AND 480
80 PRINT@485,"HIT ANY KEY TO BEG
IN";
90 EXEC44539
100 CLEAR500
110 PMODE4,1:PCLS5:SCREEN1,1:COL
OR0,1
120 A$="BD1D6U4NR5U2ER3FD6
130 B$="ND7R4FDGNL4FD2GNL4
140 I$="R4L2D7L2R4
150 N$="D7U6F5DU7D7
160 O$="BDD5FR3EU5HL3G
170 R$="ND7R4FDGNL4FD3
180 W$="D6E3F3U6
190 PCLS ' **** R ****
200 DRAW"BM162,118S4HLHLHERE2G2L
GL3M123,94U2DL2HL2HL2HL2HLHUHU7E
2H2U3EUEUEUE2RER4FRH11BM148,96HL
HLHLHL2BM160,105HLHLHUHUHUHUHU
HUNR3U3HLHLHL5GLGL9HLHLHL2NR7HUH
L2HL2HLRFR2FR2U3EUER5F2D6U6H2R2E
RNH7ER2ER7FR2FR2FR2BM116,90R13ER
EUEUBL7BUGLGD2FBL9BU3U3
210 DRAW"BM134,79U3BR8BUD4BM167,
108UEUERERBM138,59G2L2M98,48HUHU
3EUER3M145,52FRFRFRF30D2GD3GD3BM
99,39H3U2EUE2R4FR2F12BF6BDD2GBL1
3U2BU3EUBF11LGLBF8LGLBR22ND2U3HU
HBF9R2FRFBM181,87FRFRBM220,16S16
"+R$
220 FOR X=1 TO 750:NEXT X
230 PCLS ' **** A ****
240 DRAW"BM132,131S4M115,120M100
,107M94,102M91,98U4M95,88U6EU2EU
2EREUEUEUERERU5EUE3REREU3EUEUE
R4FRFM128,50RFRFRFRFM140,58M143,
63M146,66M150,72FDFDFDFD2FD2FD
FD2FD2FD3GDGDGDUEUEUEFDF2FDBM142
,116EUEUBM127,128ERERBM133,57EUE
BD5EUEBM130,52DGLGL2HLHLHL
250 DRAW"EUEUBM115,54DRDM120,60F
RFRFRD2RD2RD2RDFRDF2DF2DFD2GDGLH
LHLHLHLHLHLHM107,63BM100,76F6RFR
FRFRFRFRFRFRFRFRFBM95,86F3RFRFRF
RFRFRFRFRFRFRFBM91,99M113,106BM1
01,109ERERLGLGUEUEBM108,101EUEBU
6EUEBU8EUEBE6EUEBM126,108RFR2FR2
FBE7LHLH2UH2UHUH
260 CIRCLE(116,102),5,0,1,.87,.3
5:CIRCLE(122,95),5,0,1,.87,.37:C
IRCLE(129,88),6,0,1,.87,.35:DRAW
"BM127,84FRF2DGDGLHLHLHEUEUBE3BU
EUE2F3D2GDBG15BU2EUE2RF2D2G2LGLU
2BG2BLGDGD2R4BM122,47EBM220,16S1
6"+A$
270 FOR X=1 TO 750:NEXT X
280 PCLS ' **** I ****
290 DRAW"BM131,130S4H4NE4L3HLM10
1,107NU6H2LH2LH5U2EU2EGD2GD2M65,
73BE7M110,95":CIRCLE(70,71),6,0,
1,.48,.8:DRAW"BM74,76E2BF9G2BE7U
EUE2RERUEUEUEURERER2FRFDFDFDFDE
2RLG2FDFBL15HLRFRFRF2RBU15BR2U2E
RERERER2ER2M140,70M158,98GDGDGDE
UEUEF4BM145,112GLGLBL8BU3HUHU
300 DRAW"HUHUBL12FRFRF7BM131,90H
LHLHLHLHL":CIRCLE(111,71),17,0,1
,.1,.37:DRAW"BM100,83U3ERERERERE
RERERER7FR4FR4FBM102,78FDFDFR5E2
UHUH2BE4F4BR5U2HBR6HUH5F2EREGLU2
HUHBM110,94F3RFR3E2U2R2ERE2U2HBL
10F4DGLGL2HLHEUER3FE3RERF2GDGLGL
BM220,16S16"+I$
310 FOR X=1 TO 750:NEXT X
320 PCLS ' **** N ****
330 DRAW"BM139,124S4H8R7L7HLHLHF
```

```
RFRFL6HL2HL2H3R4ER2L2GL10M115,10
2NH2M123,89D2FDFD2NL6RER2ER5FRFR
BM109,112GDG2NU4D4GD2DG2GDG3LGL4
U11R5D6GDG2L2U16M99,98NF2E2U3NF2
M115,73L10GLGDM91,94NR2GDGDNR2D2
GD4GD5GD11NR5D8FR6L2U2EU6BM115,7
3R6FR2FR2M150,85F2RF2M165,107
340 DRAW"FRBM100,76L3GLM86,95D2F
DFDFBM92,81L2GLGDGDGDGDGDFDF3B
M220,16S16"+N$
350 FOR X=1 TO 750:NEXT X
360 PCLS '**** B ****
370 DRAW"BM148,168S4M141,158BM14
5,158M136,157M128,150M118,142M11
2,136M106,123M98,112M82,80BM113,
107M115,105GLM84,60BM123,97M125,
95GLM94,50BM134,87M137,85GLM105,
40BM120,37M142,68M167,94M172,104
M182,129M185,134M189,139BM185,13
4M182,138BM166,150
380 DRAW"BM164,104M145,100M120,1
12BM160,120M150,120M142,117EREGL
GM136,119M126,119HLHLH2U2EFRFRER
ERERHUHBM150,101M152,98M152,95BM
150,120M155,126M161,128BM149,123
M152,132M157,137M164,140BM130,12
8M143,134M155,143BM128,64ERERBM1
17,48ERERBM114,70ERER
390 DRAW"BM101,53ERERBM107,85ERE
RBM94,69ERERBM95,99EREBM88,84ERE
":CIRCLE(88,78),7,0,1,.46,.84:CI
RCLE(92,60),8,0,1,.46,.84:CIRCLE
(100,46),8,0,1,.44,.86:CIRCLE(11
5,42),8,0,1,.44,.86:DRAW"BM220,1
6S16"+B$
400 FOR X=1 TO 750:NEXT X
410 PCLS ' **** O ****
420 DRAW"BM132,131S4H4REREGLGL3H
LHLH2LH2M97,95NE3M81,84UHU2EUEUE
2RU3EUE7UEUE2RERERUEUE3RERER3FRM
131,57F3M142,72RFRFRFRFM160,98M1
56,105BR7BUH3BG14G3BU4BH4HLUHL2U
HUHUHUHUHUHU4BL20BD3FDFRFRFRFRFR
FRF3DFDFDBM105,88ERERBM134,89HLH
4UHNE2L9HL4HLHL2HUHUNR8UE
430 DRAW"U2ERER5ND6R6ERER4FR2FR2
FR2FRBL9NU2BL7H2BU5LGL4HUHUR2EUE
UBG4FDFD3GBL3UHUH2LGLGDGDGHUHUHU
EU3EU3BM102,70FDFDFBM92,63D8M100
,80NE6EH2UHUHU2ER2FBM85,74FDFDFM
96,85NE5R2ER2EU3FRE3BM96,85HUHUH
UEUERF2BM94,85D2GDGLH4UE2RF2BF3G
DGBM220,16S16"+O$
440 FOR X=1 TO 750:NEXT X
450 PCLS ' **** W ****
460 DRAW"BM162,118S4HLH2EREGLGL6
HLHL2HLHL2HLM128,100H5UHUENEL3HL
H4NE2HLHLHLHLHLHU5EUE2RER7FRFRFN
G3RFRFDFD3GDGL3HLHL4NUL4UBR3BU3U
EUBF3FRFRFRERBM139,91FRFRF2RF2BM
115,71M91,54H2UHUHU2E2R2FR2FR2FM
124,64GENE2M100,38M96,30UEUER2FR
2FM135,56GENE2M120,21UE3R3F
470 DRAW"M149,51NGF29DFDFDFDFND4
RFRFBG14GLGBU5BL7L2HLHLM148,84BU
22DFDFDBR15BD3LHLHL2GD2HL3HL3HL3
HL2GLGLGLGLGND6L6G2D4FDFDFRFRFR4
ER2EREREFRFRFRFRGDFDFRFR3BL25BU1
2L6BR13BU4U4BR7BUD5BM220,16S16"+
W$
480 FOR X=1 TO 750:NEXT X
490 GOTO 80
```

Hint . . .

Cassette Motor Control

If you want to switch external devices on and off under computer control, the cassette remote control (the smaller gray plug on the cassette cable) is a good way to do it. It's best to use the CoCo's relay to key another relay whose contacts can handle the load you intend to switch.

In many cases (such as telephone pulse dialing) the `MOTOR ON` and `OFF` commands work too slowly. You can use `POKE 65313, 4` to switch the motor on and `POKE 65313, 52` to switch it off.

MicroWorld II

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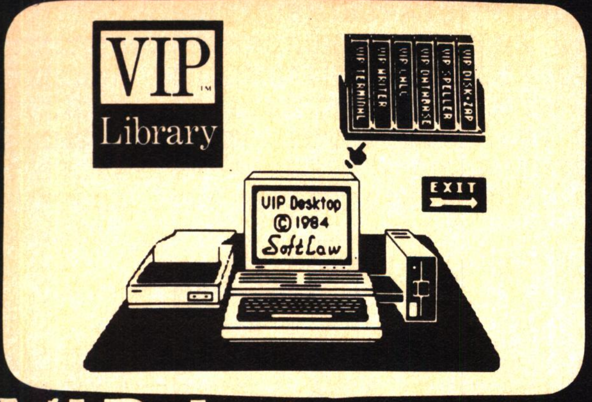

VIP Integrated Library™

VIP Desktop Magic!

Finally, you can have the power and integration of Lotus Symphony™, 1 2 3™ or Open Access™ for the larger micros on your Color Computer! The convenience of instant changes to a new application and effortless transfer of files is at the tip of your finger.

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All VIP Integrated Library applications share common features, such as ease of use, built-in help, the same commands, full printer control, full use of your 64K of memory, and step-by-step tutorials. Most important, all essential applications feature professional high resolution lowercase displays to give you a choice of 51, 64, or 85 characters per line, with 21 or 24 lines per screen. You get a professional display on your Color Computer without any hardware modification!

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Requires 64K and one or more disk drives.

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The most powerful and easy-to-use word processor is available in the showpiece and workhorse of the **Library: The VIP Writer™**.

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Among word processors for the CoCo, VIP Writer stands alone as the most versatile most professional program available." May 1984 "Comptuer User"

The **Writer** will work with you and your printer to do things you always wanted to do. Every feature of your printer can be put to use, every character set, every graphics capability at any baud rate, EVEN PROPORTIONAL SPACING. All this with simplicity and elegance.

Professional features of particular note:

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- ■ TRUE FORMAT WINDOW allowing you to preview the printed page ON THE SCREEN BEFORE PRINTING, showing centered lines, headers, FOOTNOTES, page breaks, page numbers, & margins in line lengths of up to 240 characters. It makes HYPHENATION a snap.
- ■ A TRUE EDITING WINDOW in all 9 display modes for those extra wide reports and graphs (up to 240 columns!).
- ■ FREEDOM to imbed any number of PRINTER CONTROL CODES anywhere, **EVEN JUSTIFIED TEXT.**
- ■ Full 4-way cursor control, sophisticated edit commands, the ability to edit any BASIC program or ASCII textfile, SEVEN DELETE FUNCTIONS, LINE INSERT, LOCATE AND CHANGE, wild card locate, up to TEN SIMULTANEOUS block manipulations, word wrap around, programmable tabs, display memory used and left, non-breakable space, and headers, footers and FOOTNOTES.
- ■ Automatic justification, automatic pagination, automatic centering, automatic flush right, underlining, superscripts, subscripts, pause print, single-sheet pause, and print comments.
- ■ Type-ahead, typamatic key repeat and key beep for the pros, ERROR DETECTION and UNDO MISTAKE features, 3 PROGRAMMABLE functions, auto column creation, and instant on-screen HELP.

32K (Comes with tape & disk) $69.95

Buy the VIP Speller Separately

32K Disk Only $49.95

ALL COCO OWNERS! Trade in Any Non-Game Program From Any Company And Buy VIP Integrated Library For Only $99.95

HERE'S HOW: If you already own a VIP product or any other company's product, a disk drive, and have 64K of memory, all you have to do to take advantage of this offer is send your VIP, Super "Color", or other non-game program back, with a credit card (Visa or MasterCard) number, a check, or money order for $99.95 plus $6 for shipping and handling ($10 for Canada). Send it to:

Library Upgrade Offer / VIP TECHNOLOGIES
132 Aero Camino, Santa Barbara, CA 93117

VIP Database™

"ONE OF THE BEST" JULY 1984 "RAINBOW"

This high speed MACHINE LANGUAGE program fills all your information management needs, be they for your business or home. And it does so better than any other database program for the Color Computer, featuring machine code, lowercase screens and mail-merge capabilities. Inventory, accounts, mailing lists, family histories, you name it, **VIP Database™** will keep track of all your data, and it will merge **VIP Writer™** files.

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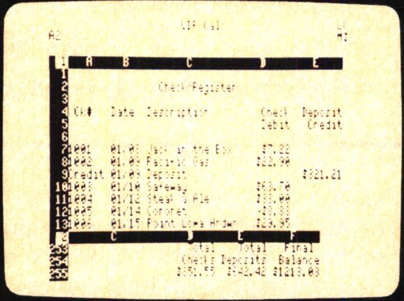
32K DISK $59.95
64K Required for math package & mail merge



```
                VIP Calc                          LC
A2                                                A2
 I  A     B          C              D        E
 1
 2             Check Register
 3
 4 Ck#    Date  Description      Check    Deposit
 5                               Debit    Credit
 6
 7 001    01/06 Jack in the Box   $7.22
 8 002    01/08 Pacific Gas      $22.90
 9 Credit 01/09 Deposit                   $321.21
10 003    01/10 Safeway          $63.70
11 004    01/12 Steak & Ale      [illegible]
12 005    01/14 Coronet          [illegible]
13 006    01/15 Point Loma Hrdwr $23.95
        C              D       E        F
253                  Total   Total    Final
254                 Checks Deposits  Balance
255                [illegible] [illegible] $1213.03
```

VIP Calc™

"MORE USABLE FEATURES" FEB 1985 "RAINBOW"

VIP Calc™ is truly the finest and easily the most powerful electronic worksheet and financial modeling program available for the Color Computer. Now every Color Computer owner has access to a calculating and planning tool better than VisiCalc™, containing all its features and commands and then some, WITH USABLE DISPLAYS.

There's nothing left out of **VIP Calc™**. Every feature you've come to rely on with VisiCalc™ is there, and then some. You get up to **5 TIMES** the screen display area of other spreadsheets for the Color Computer and Memory-Sense with **BANK SWITCHING** to give not just 24, or 30, but **UP TO 33K of WORKSPACE IN 64K!!!** This display and memory allow you the FULL SIZE, USABLE WORKSHEETS you require. You also get: User definable worksheet size, up to 512 columns by 1024 rows!* Up to **SIXTEEN VIDEO DISPLAY WINDOWS** to compare and contrast results of changes * **16 DIGIT PRECISION** * Sine, Cosine and other trigonometric functions, Averaging, Exponents, Algebraic functions. Column and Row Ascending and Descending **SORTS** for comparison of results * **LOCATE FORMULAS OR TITLES IN CELLS** * Easy entry, replication and block moving of frames * Global or Local column width control up to 78 characters per cell * Create titles of up to 255 characters per Cell * Limitless programmable functions * Typamatic Key Repeat * Key Beep * Typehead * Print up to 255 column worksheet * Prints at any baud rate from 110 to 9600 * Print formats savable along with worksheet * Enter PRINTER CONTROL CODES for customized printing with letter quality or dot matrix printer * Combine spreadsheet tables with **VIP Writer™** documents to create ledgers, projections, statistical and financial reports and budgets.

64K (Comes with tape & disk) $69.95

VIP Programs do not work with JDOS

VIP Terminal™

RATED BEST IN JANUARY 1984 "RAINBOW"

For your important communication needs you've got to go beyond software that only lets you chat. You need a smart terminal so that you can send and receive programs, messages, even other **VIP Library™** files. **VIP Terminal™** has "more features than communications software for CP/M, IBM and CP/M 86 computers." Herb Friedman, Radio Electronics, February 1984.

FEATURES: Choice of 8 hi-res lowercase displays * Memory-Sense with BANK SWITCHING for full use of workspace * Selectively print data at baud rates from 110 to 9600 * Full 128 character ASCII keyboard * Automatic graphic mode * Word mode (word wrap) for unbroken words * Send and receive **Library** files, Machine Language & BASIC programs. Duplex: Half/Full/Echo, Word length: 7 or 8, Parity: Odd/Even or None, Stop Bits: 1-9 * Local linefeeds to screen * Save and load ASCII files, Machine Code & BASIC programs * Lowercase masking * 10 Keystroke Multiplier (MACRO) buffers to perform repetitive pre-entry log-on tasks and send short messages * Programmable prompt or delay for send next line * Selectable character trapping * Send up to ten short messages (KSMs), each up to 255 characters long, automatically, to save money when calling long distance. Recommended baud rates are 110 and 300.

32K (Comes with tape & disk) $49.95
(Tape works in 16K but without hi-res displays)

VIP Disk-ZAP™

RAVED ABOUT IN THE APRIL 1983 "RAINBOW!"

Your database file disk, form letter disk, or BASIC program disk goes bad. An I/O error stops loading, or even backing up of the disk. Weeks, even months of work sit on the disk, irretrievable. Now catastrophic disk errors are repairable, quickly and with confidence, using the **VIP Disk-ZAP™**. It is the ultimate repair utility for simple and quick repair of all disk errors. Designed with the non-programmer in mind, the **VIP Disk-ZAP™** will let you retrieve all types of bashed files, BASIC and Machine Code programs. The 50 page tutorial makes the novice an expert.

16K DISK $49.95

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To Order Direct Call:

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1-800-328-2737

In California call:

1-800-468-8737

Order Status and Software Questions call
(805) 968-4364

MAIL ORDER: $3.00 U.S. Shipping per product(the library is two products). ($6.00 CANADA; $20.00 OVERSEAS). Personal checks allow 3 weeks.

All prices subject to change without notice.

VIP™
Technologies

132 Aero Camino
Santa Barbara,
California 93117

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16K ECB

The Daily Schedule Pictograph: A Time For Every Purpose

By Steve Blyn
Rainbow Contributing Editor

This month's program presents a "pictograph" which illustrates children's daily schedules. A pictograph is one of the types of graphs usually studied in elementary school. The other types of graphs are the bar, line and circle.

Pictographs are fun because they use one or more pictures to depict amounts. In our example, a clock represents one hour in the child's daily schedule. We have divided the child's typical school day into four categories: school time, bedtime, time for television and time for play.

We chose only four activities to keep the graph large and simple for instuctional purposes. There are, of course, other activities such as homework, mealtimes and chores. You may alter the program to suit your purposes.

The topic of daily schedules was selected because of its importance to the children. Using their own activities focuses interest on the task at hand. Children are likely to partake in the learning whenever new topics can be related to their own experiences.

Pictograph begins by asking the child to input the amount of integer hours consumed by school, bed and watching TV. The program then adds up these three amounts and subtracts this amount from 24. This is done on the screen. The child can see how much free time is left for play activities. Children may enjoy checking the computer's calculations. This can also be done for reinforcement of arithmetic skills.

An appreciation for time budgets can be gained by using *Pictograph*. Many children, for example, watch an excessive amount of TV. By bringing this out in the program, they can see they have little time left for play. Children who get an improper amount of sleep can also see similar results from this program.

It is interesting that many children will be more likely to answer these questions more truthfully to a computer than to a parent or teacher. Computers are obviously inanimate objects and are probably viewed by children to be non-judgemental. It is often easier, therefore, to confess one's transgressions to a machine than to a person.

If used with a class or a group, children can compare and discuss their pictographs. Averages of the various amounts of time that children spend on TV and play can be interesting. A child can then compare his habits with those of other classmates.

It should be stressed that different people naturally require different amounts of sleep. Only unusually high or low amounts should be noted and discussed privately with the child.

Lines 120-190 ask for the amount of hours spent on school, sleep and television. The program checks for reasonable answers. Sometimes ridiculous answers are input into a program merely for mischief. It is always a good idea to program safeguards against this. The program checks on lines 130, 160 and 190 for answers within acceptable limits. Answers outside of these limits will not be accepted. You may, of course, change these limits if you disagree with any of them.

Lines 200-260 add up these three amounts on the screen and subtract them from 24. This shows the amount of hours left for play. This was done by the computer to prevent any mistakes. The total must obviously be 24. Younger children will have to be taught that there really are only 24 hours in each day.

(Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He and his wife, Cheryl, own Computer Island.)

Lines 300-580 draw the pictograph. Lines 620-720 place the shapes of the letters needed into strings. Each activity will show the first letter of the activity followed by the proper number of clocks. A picture of a clock represents one hour of activity time. Children can see that the activities with the greater number of clocks drawn are those on which they spend the most time.

It is often said a picture is worth a thousand words. Pictographs present an interesting way of representing data from which youngsters can learn. The pictrograph is probably the easiest type of graph to explain. At the level used in this program, it is merely a counting exercise.

The next step in learning pictographs is to have each symbol represent more than one of an item. For example, each picture of a person could represent 100,000 people in a population pictograph. If you desire such follow-up activity, more sophisticated pictographs can often be found in many newspaper articles for further study.

190 63
430 220
END 228

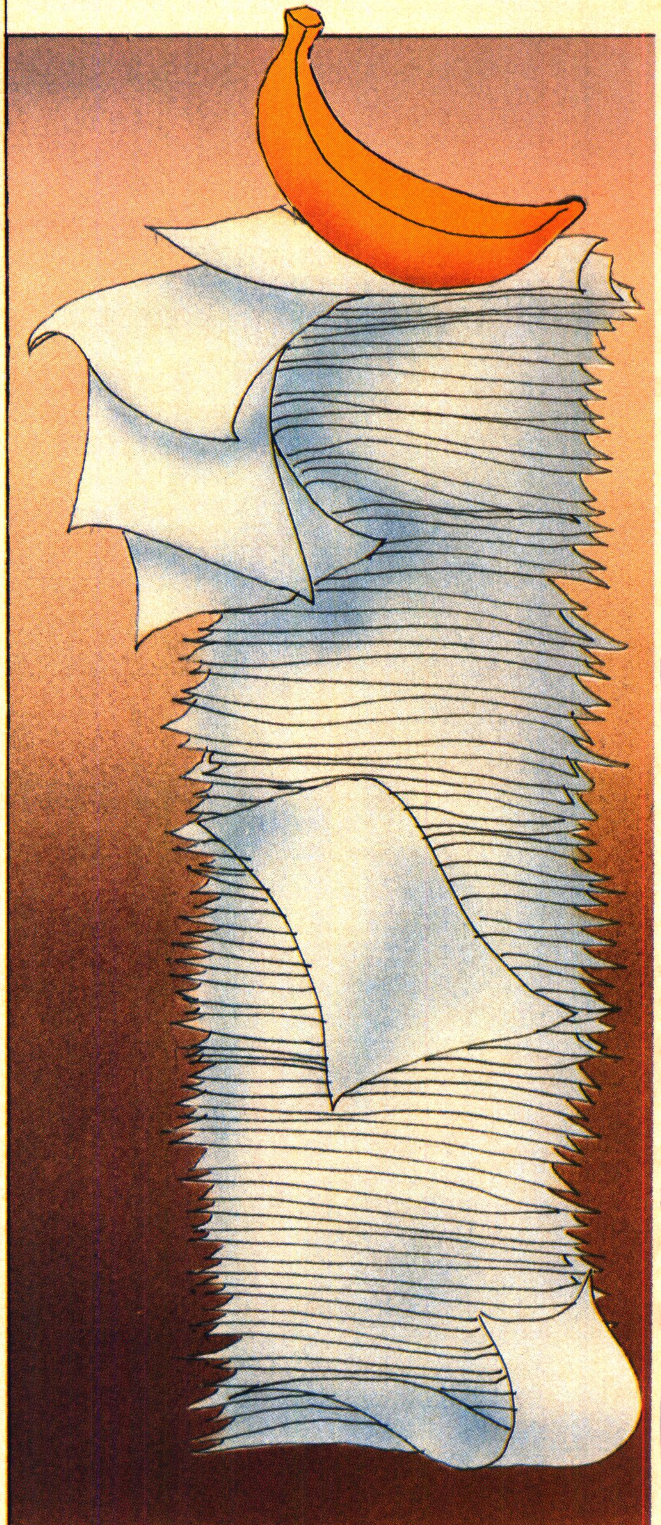
The listing: `PICGRAPH`

```
10 CLEAR 5000
20 REM"PICTOGRAPH"
30 REM"STEVE BLYN,COMPUTER ISLAN
D,NY,1985
40 REM SC=SCHOOL   BD=BEDTIME
      TV=TV TIME   PL=PLAYTIME
50 FF$=STRING$(32,255):REM COLOR
ED LINE
60 DIM V(20,20):REM DIMENSION OF
 THE CLOCK PICTURE ARRAY
70 GOSUB 620:REM READ THE LETTER
S
80 CLS
90 PRINT"       MY DAILY SCHEDUL
E"
100 PRINTFF$;
110 PRINT@64," "
120 PRINT@64,"HOW MANY HOURS IN
SCHOOL";:INPUT SC
130 IF SC<2 OR SC>10 THEN 110
140 PRINT@128," "
150 PRINT@128,"HOW MANY HOURS FO
R BED";:INPUT BD
160 IF BD<5 OR BD>12 THEN 140
170 PRINT@192," "
180 PRINT@192,"HOW MANY HOURS FO
R TV";:INPUT TV
190 IF TV<1 OR TV>9 THEN 170
200 TL=SC+BD+TV:'TOTAL
210 PL=24-TL:'PLAY TIME
220 PRINT@224,FF$;
230 PRINT@256,"           "SC"+"BD"
+"TV"="TL
240 PRINT@288,"           24 -"TL"
="PL
250 PRINT@320,FF$;
260 PRINT@385,"THAT LEAVES";PL;"
HOURS FOR PLAY."
270 PRINT@449,"PRESS ENTER TO SE
E YOUR GRAPH.";
280 EN$=INKEY$
290 IF EN$=CHR$(13) THEN 300 ELS
E 280
300 PCLS:SCREEN1,1:PMODE3,1
310 CIRCLE(128,96),70,4,1
320 PCLS5:SCREEN1,1:PMODE3,1
330 DRAW"BM75,12S4C6"+S$+C$+H$+E
$+D$+U$+L$+E$
340 COLOR7:LINE(20,25)-(235,20),
PSET,BF
350 CIRCLE(30,50),10,4,1
360 COLOR8
370 LINE(30,44)-(30,50),PSET:LIN
E-(34,50),PSET
380 GET(20,40)-(40,60),V
390 FOR T=1 TO SC
400 DRAW"BM0,55S4C6"+S$
410 PUT(20+J,40)-(40+J,60),V
420 J=J+25
430 NEXT T
440 J=0:FOR T=1 TO BD
450 DRAW"BM0,85"+B$
460 PUT(20+J,70)-(40+J,90),V
470 J=J+25
480 NEXT T
490 J=0:FOR T= 1 TO TV
500 DRAW"BM0,115"+T$
510 PUT(20+J,100)-(40+J,120),V
520 J=J+25
530 NEXT T
540 J=0:FOR T= 1 TO PL
550 DRAW"BM0,145"+P$
560 PUT(20+J,130)-(40+J,150),V
570 J=J+25
580 NEXT T
590 J=0
600 EN$=INKEY$
610 IF EN$=CHR$(13) THEN RUN ELS
E 600
620 REM" THE LETTERS NEEDED"
630 B$="U8R6F2D2L8BR8D2G2L6BR12"
640 C$="U8R8BD8L8BR12"
650 D$="U8R6F2D4G2L6BR12"
660 E$="U8R8BD4L8BD4R8BR4"
670 H$="U8BR8D8BU4L8BD4BR12"
680 L$="U8BD8R8BR4"
690 P$="U8R8D4L8BD4BR12"
700 S$="BU4U4R8BD4L8BR8D4L8BR12"
710 T$="BU8R8BL4D8BR8"
720 U$="U8BR8D8L8BR12"
730 RETURN
```

TEACHER'S AID

By Garry L. Shelton

This helpful program really 'makes the grade' and could very well be the teacher's pet



Teaching an evening class is a lot of fun and quite a learning experience, but when the end of the quarter comes, ugh! I hate averaging grades! It's boring and takes a lot of time.

I decided to combine my favorite hobby with teaching and came up with *Teacher's Aid.* Now, I save time and actually enjoy averaging grades. (Well, CoCo enjoys it.)

Teacher's Aid is designed to do as much of the manual labor as possible. It has several features any teacher could appreciate. Among these are:

Calculates grade average (weighted or straight average, and drop lowest grade)
Determines letter grade
Maintains a file of up to 35 students
Cursor control when entering data
User prompts

For those of you who wish to follow this program, I have included `REMarks` throughout. Table 1 contains a list of the main variables used.

Program Operation

Teacher's Aid will run unchanged on a 32K Color Computer with Extended `BASIC` and is configured for a tape-based system. To use it, simply `CLOAD` the program and type `RUN`.

(Garry Shelton is an accountant for the pension and profit-sharing department of a large retail organization. He also teaches accounting at a local community college. His future goal is to start his own accounting and data processing business.)

32K ECB

The first screen to appear will be the title, followed by the menu. This menu offers seven options from which to choose. These are:

1) Start New Class
2) Enter Data
3) Perform Calculations
4) Display Data
5) Print Data
6) Save File
7) Quit

To select an option, type the number and press ENTER. Each option will be discussed in general order of use.

There is no routine for the "Print Data" option because I do not have a printer. I have left a block of line numbers, 5000 to 5999, open so you can add your own print routine.

Start New Class

This option is used when beginning a new class. It does not have to be used before entering student data, but it must be used before calculations are made. To begin, you will be asked to enter the following:

Class name	25 characters
Course number	8 characters
Section number	4 characters
Beginning class date	6 characters
Ending class date	6 characters
Number of class days	3 characters

Each item must be limited to the number of characters specified. If you exceed the allowed number, then you will be prompted to reenter the item. After each item has been entered, you will be asked whether or not it is correct, then respond with 'Y' or 'N.'

Teacher's Aid determines the letter grade based on a student's average. You supply your own grade scale for each grade of A, B, C, D or F. For each grade, you are directed to enter the upper value for that letter, then the low value. You are then given the opportunity to correct an error.

When supplying the grade ranges, you must not let them overlap. For example, if the range for 'B' is 92 for the upper value and 88 for the low value, then C's upper range would be 87, not 88.

Following the entry for 'F,' *Teacher's Aid* will switch directly to the "Enter Data" option and be ready to accept data.

Table 1

List of Variables

R$(X,Y)	Student record: X=student, Y=field
HR$	Class information
G(X)	Grade scale hi/low amounts
F1$	Drop lowest grade flag
F2$	Drop "this?" grade flag
F3$	Grade dropped? flag
TEST	Test to exclude from being dropped
WT	Weight of test with different weight
TW	Test which has different weight
TN	Number of test given
GRADE(X)	Grade calculation storage "buckets"
GT	Sum of grades
AVG	Grade average
DO	Days absent (calculation purposes)
ND	Days in the school term
ET	Equal test "storage bucket"
E$	INKEY$ input variable
EN$	Various: temporary storage; "press ENTER when ready . . ."
CH	Menu option choice
PF	Display screen capacity
P	Records displayed counter

Enter Data

If this routine is entered directly from the "Start New Class" option, the screen will be formatted and ready to accept data. If this option is entered from the menu, you will be asked whether or not you wish to use a previous file; answer with 'Y' or 'N.' Given a 'Y' response, the program will direct you to enter the filename (limit to eight characters). Prepare the tape recorder and press ENTER when ready to load the file. Note: When adding records to a previously started file, the file must be loaded first.

An 'N' response or completion of file loading will cause the screen to be formatted for data input with the last record on file being displayed. This format will look like Figure 1. Each record will consist of 14 fields, 11 of which you may enter. The fields are:

Name
Social Security number
Grades (up to eight)
Number of days absent
Grade average
Letter grade
Percent absent

The fields' grade average, letter grade and percent absent are supplied by the "Perform Calculations" option.

This option is simple to use with only a few commands to remember. These commands are:

→	Move to the next record
←	Move to the previous record
↓	Move cursor down a field
↑	Move cursor up a field
@	Update field the cursor is on
/	Search for a specified record
CLEAR	Return to the menu (Careful: *only* for this section)

When the screen is first formatted and as each new record appears, the cursor (a red block) appears on field one, "Name." To enter the student's name, press '@' to gain access to the field, type in the name then press ENTER. The backspace key may be used to backspace before ENTER is pressed. The cursor automatically moves to the next field, which in this case is "Social Security number." Follow the same procedure to enter this.

Now, assume that so far you have not given any tests but wish to enter an amount for number of days absent. Use the down-arrow key to skip past the grades and get to the correct field. After this field has been entered, the next record will appear.

When entering grades, fill up the fields beginning with grade one and go in order. You may leave blanks only at the end of the grades. Also, all grades must be entered as integers, i.e., 95, not 94.8 (see Figure 1).

To move back and forth between records, use the left- and right-arrow keys. You can also use the slash key (/) search command. *Teacher's Aid* gives the choice of searching by name or Social Security number. Prompts will appear instructing you what to do.

Deleting a record is just as easy as entering one. To do so, blank out both the name and Social Security number. This can be accomplished by typing '@' and ENTER for each field. *Teacher's Aid* will delete the record(s) upon exit from the "Enter Data" option. To exit this option, simply press the CLEAR key. There will be a short pause as the file is being scanned for possible deletions.

If the computer seems to hang up while you are entering data, it is because CoCo is rearranging its strings in memory. You just have to sit back and wait a moment.

Perform Calculations

This option is the reason I wrote *Teacher's Aid* — to calculate grades. It will calculate the grade average, the letter grade and percent of absence. Several prompts are used which will determine how the grades will be averaged. These are:

1) Drop lowest grade? — If you wish to drop the lowest grade before calculation of the average, then answer 'Y.'
2) Exclude one test? — If you answered 'Y' to dropping a grade, then you are given the choice of excluding a grade from being dropped. For example, I do drop the lowest grade, but I never allow the final exam to be dropped. Answer this with 'Y' or 'N.'
3) Which test number? — If you choose to exclude a test, then enter the number of that test.
4) Will one test have a different weight? — Sometimes my final will count more or less than a regular test grade, so I have allowed for a different weight to be used.
5) Enter the weight as a decimal — When answering 'Y' to question #4, you must input the weight. Answer with a number greater than zero and less than one.
6) Which test number? — Simply enter the test number of the one with the different weight.
7) How many tests? — Answer this with the total number of tests you gave regardless of whether or not one will be dropped.

After you have gone through these questions, *Teacher's Aid* will take over. You can sit back and relax because the calculations may take several minutes depending upon the number of students and options chosen. When finished, you will be alerted by a buzz and the menu will appear.

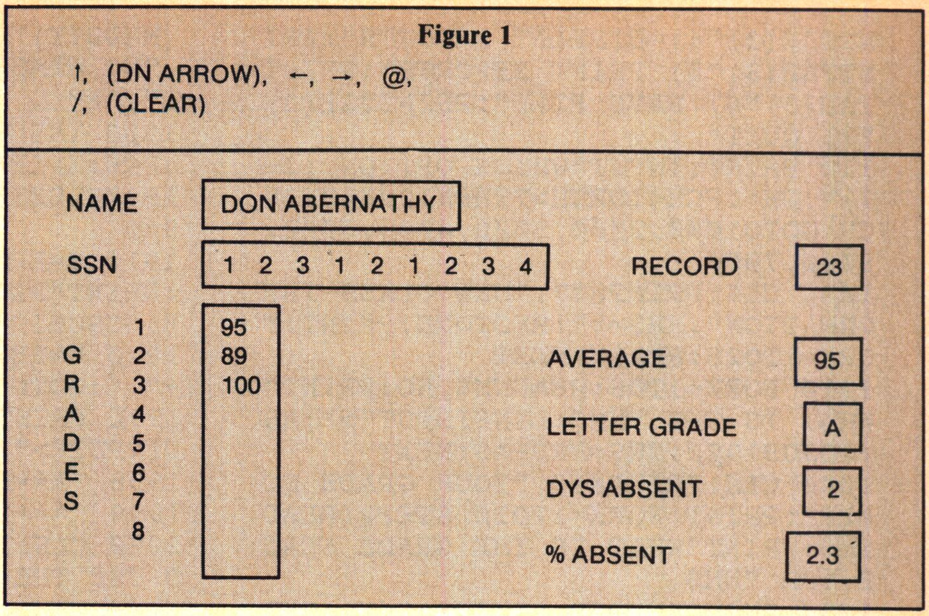


Figure 1

↑, (DN ARROW), ←, →, @,
/, (CLEAR)

NAME DON ABERNATHY

SSN 1 2 3 1 2 1 2 3 4

RECORD 23

GRADES

1 95
2 89
3 100
4
5
6
7
8

AVERAGE 95

LETTER GRADE A

DYS ABSENT 2

% ABSENT 2.3

Display Data

This option displays the data you have supplied. Actually, you could use the "Enter Data" option to get student information, but this one puts more records on the screen at one time. The program gives several options which are:

1) Record dump
2) Display grades
3) Display absences
4) Quit

Option one will display the entire record of each student. Option two will display name, Social Security number, grade average and letter grade. Option three will display name, Social Security number, number of days absent and percent absent for students who have been absent. Option four returns the program to the menu.

Save File

Using this option is much like loading a file. You will be prompted to enter the filename, then press ENTER when the recorder is ready. After the file has been saved, the menu will appear.

Quit

This option allows you to end program execution. I designed a safety feature to prevent inadvertent ending of *Teacher's Aid*. You will be asked if you are sure you wish to quit — answer with 'Y' or 'N.' An 'N' will return you to the menu.

Teacher's Aid was written primarily for use in a college classroom setting, but the concepts would apply in a variety of classroom situations. Anyone needing help making changes or using this program may write me at 521 Annex Avenue, Kannapolis, NC 28081 (please include a SASE).

1000	205	2900	218
1990	154	3060	76
2060	100	3200	193
2120	153	3998	8
2240	84	4129	117
2760	235	END	127

The listing: TEACHAID

```
5 CLS:FORX=0TO31:POKE1024+X,106:
FORY=1TO10:NEXTY,X:PRINT@137,"TE
ACHER'S AID":PRINT@202,"(C) 1984
 BY":PRINT@297,"GARRY L SHELTON"
:FORX=511TO480STEP-1:POKE1024+X,
106:FORY=1TO10:NEXTY,X:FORX=1TO1
000:NEXT
10 CLS:CLEAR5000,32567:DEFUSR=32
568:N=1:C1$=STRING$(4,32):C2$=ST
RING$(32,32):DIMR$(35,14)
20 DATA 134,0,198,1,142,4,0,166,
132,129,127,34,4,134,63,164,132,
167,128,140,6,0,38,239,57
30 FORX=32568TO32592:READY:POKEX
,Y:NEXT
100 CLS:PRINT@69,"MAIN MENU":PRI
NT:PRINTTAB(3)"1) NEW CLASS":PRI
NTTAB(3)"2) DATA ENTRY":PRINTTAB
(3)"3) PERFORM CALCULATIONS":PRI
```

```
NTTAB(3)"4) DISPLAY REPORTS":PRI
NTTAB(3)"5) PRINT REPORTS":PRINT
TAB(3)"6) SAVE FILE":PRINTTAB(3)
"7) QUIT"
110 PRINT:INPUT"WHICH OPTION (1-
7)";CH:IFCH<1ORCH>7THEN100ELSEON
CH GOTO1000,2000,3000,4000,5000,
6000,7000
1000 CLS:PRINT@37,"NEW CLASS INF
ORMATION":HR$="":RESTORE:PRINT:F
ORX=1TO25:READY:NEXT
1010 FORX=1TO6:READNM$,NO:PRINT"
WHAT IS THE "NM$:LINEINPUT">";A$
:GOSUB1900:HR$=HR$+A$:NEXT
1020 CLS:PRINT@40,"YOUR GRADE SC
ALE":PRINT:FORX=1TO10 STEP2:READ
NM$:PRINT"WHAT IS THE GRADE SCAL
E FOR "NM$
1030 INPUT"UPPER LIMIT";G(X):INP
UT"LOWER LIMIT";G(X+1):PRINT:INP
UT"ARE THEY CORRECT? Y/N";EN$:IF
LEFT$(EN$,1)<>"Y"THENPRINT"RE-EN
TER THE: ":GOTO1030ELSENEXT
1040 CLS:PRINT@195,"YOU MAY ENTE
R STUDENT DATA":FORX=1TO500:NEXT
:GOTO2070
1800 DATA "CLASS NAME",25,"COURS
E NO",8,"SECTION NO",4,"BEG DAY
(MMDDYY)",6,"END DAY (MMDDYY)",6
,"NO CLASS DAYS",3,"A","B","C","
D","F"
1900 INPUT"IS THIS CORRECT? Y/N"
;EN$:IFLEFT$(EN$,1)="N"THENGOSUB
1990ELSEIFLEFT$(EN$,1)<>"Y"THEN1
900
1910 E=LEN(A$):IF E>NO THENPRINT
:PRINT"PLEASE LIMIT TO"NO" CHARS
":GOSUB1990:GOTO1900
1920 E=LEN(A$):IF E<NO THENA$=A$
+" ":GOTO1920ELSERETURN
1990 PRINT"RE-ENTER THE "NM$:LIN
EINPUT">";A$:RETURN
1998 '***DATA ENTRY OPTION***
1999 '***LOAD PREVIOUS FILE***
2000 CLS:PRINT@32,"DO YOU WISH T
O USE THE PREVIOUS FILE? (Y/N)";
:INPUTEN$:IFLEFT$(EN$,1)="N"THEN
2070ELSEIFLEFT$(EN$,1)<>"Y"THEN2
000
2010 CLS:PRINT@41,"LOAD PREVIOUS
 FILE":PRINT:INPUT"WHAT IS THE F
ILE NAME";F$:PRINT:INPUT"GET REC
ORDER READY-PRESS <ENTER>";EN$:N
=0:CLS
2020 OPEN"I",#-1,F$:INPUT#-1,HR$
:PRINT@99,MID$(HR$,1,25):PRINT@1
30,MID$(HR$,38,6);" THRU ";MID$(
HR$,44,6):PRINT@162,"SECTION # "
;MID$(HR$,34,4);"   ";MID$(HR$,2
6,8)
2030 INPUT"IS THIS THE CORRECT F
ILE? Y/N";EN$:IFLEFT$(EN$,1)="N"
THENCLOSE:GOTO100ELSEIFLEFT$(EN$
,1)<>"Y"THEN2030
2040 FORX=1TO10:INPUT#-1,G(X):NE
XT
2050 IFEOF(-1)THENCLOSE:GOTO2070
2060 N=N+1:FORX=1TO14:INPUT#-1,R
$(N,X):NEXT:GOTO2050
2070 IFN=35 THENCLS:PRINT:PRINT"
FILE LIMIT REACHED UPDATE ONLY
NO NEW RECORDS":FORX=1TO1500:NEX
T:M=N ELSEM=N
2099 '***UPDATE FILE/ENTER DATA*
*
2100 GOSUB2700
2110 GOSUB2770:GOSUB2720:P=103:P
OKE1023+P,191:PRINT@0," ^, (DN A
RROW), <-, ->, @,       /, (CLEA
R)"
2120 GOSUB2800:E=ASC(E$):IFE=64T
HEN2140ELSEIFE=10THEN2170ELSEIFE
=94THEN2190ELSEIFE=8THEN2230ELSE
IFE=9THEN2205ELSEIFE=47THEN2240E
LSEIFE=12THEN2900
2130 GOTO2120
2138 '***INPUT A FIELD***
```

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```
2139 '***PLACE FIELD INTO RECORD
*
2140 POKE1023+P,32:GOSUB2810:IFP
=103THENR$(M,1)=I$ELSEIFP=167THE
NR$(M,2)=I$ELSEIFP=408THENR$(M,1
1)=I$ELSEF=(P-135)/32:R$(M,F)=I$
2149 '***CALCULATE NEXT FIELD***
CURSOR POSITION
2150 IFP=103 OR P=167 THENT=P+64
 ELSEIFP=408 THENGOTO2210ELSEIFP
=455 THENT=408 ELSET=P+32
2160 GOTO2200
2169 '***MOVE CURSOR DOWN***
2170 IFP=408 THEN2120ELSEIFP=103
 OR P=167 THENT=P+64 ELSEIFP=455
 THENT=408 ELSET=P+32
2180 GOTO2200
2189 '***MOVE CURSOR UP***
2190 IFP=103 THEN2120ELSEIFP=408
 THENT=455 ELSEIFP=231 OR P=167
THENT=P-64 ELSET=P-32
2200 POKE1023+P,32:P=T:POKE1023+
P,191:GOTO2120
2203 '***MOVE ONE RECORD FORWARD
2205 IFM>N+1 THEN2120
2208 '***CHECK FOR FILE LIMIT***
2209 '***MOVE ONE RECORD UP***
2210 IFM=35 THENGOSUB2770:PRINT@
0,"FILE LIMIT REACHED
   START NEW FILE":FORX=1TO1000:
NEXT:GOTO2110ELSEIFM=N THENN=N+1
:M=M+1 ELSEM=M+1
2220 POKE1023+P,32:GOTO2110
2229 '***MOVE ONE RECORD BACK***
2230 IFM=1 THEN2120ELSEM=M-1:GOT
O2220
2239 '***SEARCH BY NAME OR SSN**
2240 GOSUB2770:PRINT@0,"nAME OR
sSN?":GOSUB2800:GOSUB2770:IFE$="
N" THENF=1:PRINT@0,"ENTER THE NA
ME":INPUTN$ELSEIFE$="S" THENF=2:
PRINT@0,"ENTER THE SSN":INPUTN$E
LSE2240
2260 FORX=1TON:IFR$(X,F)=N$ THEN
M=X:X=N:F=0
2270 NEXT:IFF<>0THENGOSUB2770:PR
INT@0,"RECORD NOT FOUND":FORX=1T
O1000:NEXT
2280 GOTO2220
2700 CLS:PRINT@96,"NAME":PRINT@1
60,"SSN":PRINT@177,"RECORD":PRIN
T@228,"1":PRINT@257,"G":PRINT@26
0,"2":PRINT@269,"AVERAGE":PRINT@
289,"R":PRINT@292,"3":PRINT@321,
"A":PRINT@324,"4":PRINT@333,"LET
TER GRADE":PRINT@353,"D":PRINT@3
56,"5":PRINT@385,"E"
2710 PRINT@388,"6":PRINT@397,"DY
S ABSENT":PRINT@417,"S":PRINT@42
0,"7":PRINT@452,"8":PRINT@461,"%
 ABSENT"
2715 X=USR(0)
2720 PRINT@103,C1$+C1$+C1$+C1$+C
1$;:PRINT@167,C1$+C1$+"  ";:PRIN
T@184,"   ";:PRINT@231,C1$;:PRIN
T@263,C1$;:PRINT@279,C1$;:PRINT@
295,C1$;:PRINT@327,C1$;:PRINT@34
6," ";:PRINT@359,C1$;:PRINT@391,
C1$;:PRINT@408,"   ";:PRINT@423,
C1$;
2730 PRINT@455,C1$;:PRINT@470,C1
$+" ";
2750 PRINT@103,R$(M,1);:PRINT@16
7,R$(M,2);:PRINT@184,M;:PRINT@23
1,R$(M,3);:PRINT@263,R$(M,4);:PR
INT@279,R$(M,12);:PRINT@295,R$(M
,5);:PRINT@327,R$(M,6);:PRINT@34
6,R$(M,13);:PRINT@359,R$(M,7);
2760 PRINT@391,R$(M,8);:PRINT@40
8,R$(M,11);:PRINT@423,R$(M,9);:P
RINT@455,R$(M,10);:PRINT@470,R$(
M,14);:RETURN
2770 PRINT@0,C2$+C2$;:RETURN
2800 E$=INKEY$:IFE$=""THEN2800EL
SERETURN
2810 X=0:I$=""
2815 E$=INKEY$:IFE$=""THENPRINT@
```

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```
P+X,CHR$(191);:PRINT@P+X,CHR$(19
1);:PRINT@P+X,CHR$(32);:GOTO2815
ELSEE=ASC(E$):IFE=13THEN2830ELSE
IFE=8THENIFX=0THEN2815ELSEX=X-1:
I$=LEFT$(I$,(LEN(I$)-1)):PRINT@P
+X," ";:GOTO2815
2820 I$=I$+E$:PRINT@P+X,E$;:X=X+
1:GOTO2815
2830 IFP=103THENE=20ELSEIFP=167T
HENE=9ELSEIFP=408THENE=3ELSEE=4
2840 PRINT@P,STRING$(E,32);:PRIN
T@P,I$;:RETURN
2899 '***DELETE RECORDS***
2900 FORX=1TON:IFR$(X,1)="" AND
R$(X,2)="" THENY=X:X=N ELSENEXTX
:GOTO100
2910 NEXTX:FORX=Y TO N-1:FORZ=1T
O14:R$(X,Z)=R$(X+1,Z):NEXTZ,X:FO
RX=1TO14:R$(N,X)="":NEXTX:N=N-1:
GOTO2900
2998 '***PERFORM CALCULATIONS***
2999 '***OBTAIN AVERAGE-OPTIONS*
3000 CLS:F1$="0":F2$="0":F3$="0"
:INPUT"DO YOU WISH TO DROP THE L
OWEST  GRADE? (Y/N)";EN$:IFLEFT$
(EN$,1)="N"THEN3030ELSEIFLEFT$(E
N$,1)<>"Y"THEN3000
3010 F1$="Y":PRINT:INPUT"WILL ON
E GRADE BE EXCLUDED? Y/N";EN$:IF
LEFT$(EN$,1)="N"THENTEST=0:GOTO3
030ELSEIFLEFT$(EN$,1)<>"Y"THEN30
10
3020 INPUT"WHICH TEST NUMBER";TE
ST:IFTEST<1 OR TEST>8 THENGOSUB3
350:GOTO3020
3030 PRINT:INPUT"WILL ONE TEST H
AVE A DIFFERENT  WEIGHT? Y/N";EN
$:IFLEFT$(EN$,1)="N"THENWT=0:GOT
O3060ELSEIFLEFT$(EN$,1)<>"Y"THEN
3030
3040 PRINT"ENTER THE WEIGHT AS A
 DECIMEL":INPUTWT:IFWT<0 OR WT>1
 THENPRINT"MUST BE FROM ZERO TO
ONE":GOTO3040
3050 INPUT"WHICH TEST NUMBER";TW
:IFTW<1 OR TW>8 THENGOSUB3350:GO
TO3050
3060 PRINT:INPUT"HOW MANY TESTS
ARE THERE";TN:IFTN<1 OR TN>8 THE
NGOSUB3350:GOTO3060
3070 CLS:PRINT@160,"PLEASE WAIT-
CALCULATING GRADES"
3098 '***PLACE GRADES INTO STORA
GE VARIABLES***
3099 '***DROP LOWEST GRADE***
3100 FORZ=1TON:F3$="0":TT=TN:FOR
X=1TO8:GRADE(X)=0:NEXTX:ET=200
3110 FORX=1TOTN:F2$="0":IFF1$<>"
Y"THEN3180
3120 IFTEST=X THEN3180
3130 FORY=TN TO1 STEP-1:IFX=Y TH
ENY=Y-1
3140 IFY=TEST THENY=Y-1
3150 IF VAL(R$(Z,X+2))>=VAL(R$(Z
,Y+2)) THENF2$="Y"
3160 IF VAL(R$(Z,X+2))=VAL(R$(Z,
Y+2)) AND VAL(R$(Z,X+2))<ET THEN
ET=VAL(R$(Z,X+2))
3170 NEXTY:IFF2$="0"THENGRADE(X)
=0:F3$="Y":GOTO3190
3180 GRADE(X)=VAL(R$(Z,X+2))
3190 NEXTX
3199 '***AVERAGE GRADES***
3200 GT=0:FORX=1TOTN:GT=GT+GRADE
(X):NEXTX
3210 IFF1$="0"THEN3230ELSEIFF3$<
>"Y"THENGT=GT-ET
3220 TT=TT-1
3230 IFWT<>0  THENTT=TT-1
3240 AVG=INT((((GT-GRADE(TW))/TT
)*(1-WT)) + (GRADE(TW)*WT) +.5):
EN$=STR$(AVG):R$(Z,12)=MID$(EN$,
2,3)
3249 '***DETERMINE LETTER GRADE*
3250 FORX=1TO10 STEP2:IFAVG<=G(X
) AND AVG>=G(X+1) THENONX GOSUB
3300,3300,3310,3310,3320,3320,33
30,3330,3340:X=10
3260 NEXTX
3269 '***CALCULATE % OF ABSENCE*
3270 DO=VAL(R$(Z,11)):ND=VAL(MID
$(HR$,50,3)):DO=(DO/ND)*100:EN$=
STR$(DO):R$(Z,14)=MID$(EN$,2,4)
3280 PRINT@224,STRING$(31," "):P
RINT@227,"PLEASE WAIT--STILL WOR
KING"
3290 NEXTZ:SOUND10,10:GOTO100
3299 '***GRADE SUBROUTINES***
3300 R$(Z,13)="A":RETURN
3310 R$(Z,13)="B":RETURN
3320 R$(Z,13)="C":RETURN
3330 R$(Z,13)="D":RETURN
3340 R$(Z,13)="F":RETURN
3349 '***ERROR MESSAGE***
3350 PRINT"TEST NUMBERS RANGE FR
OM 1 TO 8":RETURN
3998 '***DISPLAY DATA OPTION***
3999 '***DISPLAY MENU***
4000 CLS:PRINT@162,"DISPLAY DATA
":PRINT:PRINTTAB(3)"1) RECORD DU
MP":PRINTTAB(3)"2) DISPLAY GRADE
S":PRINTTAB(3)"3) DISPLAY ABSENC
E":PRINTTAB(3)"4) QUIT":PRINT
4010 INPUT"ENTER YOUR CHOICE";CH
:IFCH<1 OR CH>4 THEN4000ELSEIFCH
=4 THEN100
4020 IFCH=1 THENPF=2 ELSEPF=4
4039 '***DISPLAY CLASS NAME***
```

```
4040 GOSUB4200
4048 '***SET UP LOOP***
4049 '***GO TO DISPLAY SUBS.***
4050 FORX=1TON:ONCH GOSUB4100,41
30,4140,:P=P+1:IFP=PF THENGOSUB4
210:GOSUB4200
4060 NEXTX:IFP<>0 THENGOSUB4210:
GOTO4000ELSE4000
4098 '***DISPLAY SUBROUTINES***
4099 '***RECORD DUMP***
4100 PRINTX" "R$(X,1);TAB(28)R$(
X,13):PRINTR$(X,2)"      "R$(X,12)
;TAB(19)R$(X,11);TAB(25)R$(X,14)
"%":FORZ=3TO9:PRINTR$(X,Z)" ";:N
EXTZ:PRINTR$(X,10):PRINTSTRING$(
32,"*");:RETURN
4129 '***DISPLAY GRADES***
4130 PRINTX" "R$(X,1);TAB(28)R$(
X,13):PRINTR$(X,2);TAB(25)R$(X,1
2):PRINTSTRING$(32,"*");:RETURN
4139 '***DISPLAY ABSENCE***
4140 IFR$(X,11)="" OR R$(X,11)="
0" THENP=P-1:RETURN ELSEPRINTX"
"R$(X,1);TAB(25)R$(X,11):PRINTR$
(X,2);TAB(24)R$(X,14)"%":PRINTST
RING$(32,"*");:RETURN
4199 '***DISPLAY CLASS NAME***
4200 CLS:P=0:PRINT@3,MID$(HR$,1,
25):IFCH=1THENPRINT@41,"NAME";TA
B(25)"GRADE":PRINT@67,"SSN";TAB(
13)"AVG";TAB(18)"DYS OUT    %":P
RINT@105,"TEST GRADES"
4205 PRINTSTRING$(32,"*");:RETUR
N
4209 '***WAIT***
4210 INPUT"PRESS <ENTER> TO CONT
INUE";EN$:RETURN
5000 CLS:PRINT"PRINT ROUTINE NOT
 AVAILABLE":FORX=1TO1000:NEXT:GO
TO100
5999 '***SAVE FILE OPTION***
6000 CLS:INPUT"ENTER THE FILE NA
ME";F$:PRINT:INPUT"GET RECORDER
READY-PRESS <ENTER>";EN$:MOTORON
:OPEN"O",#-1,F$:PRINT#-1,HR$:FOR
X=1TO100:NEXT:FORX=1TO10:PRINT#-
1,G(X):NEXT:FORX=1TON:FORY=1TO14
:PRINT#-1,R$(X,Y):NEXTY,X:MOTORO
FF
6010 CLOSE:GOTO100
7000 CLS:INPUT"ARE YOU SURE? Y/N
";EN$:IFLEFT$(EN$,1)="N" THEN100
ELSEIFLEFT$(EN$,1)<>"Y" THEN7000
7010 PRINT:PRINT"**********PROGR
AM END***********":END
```

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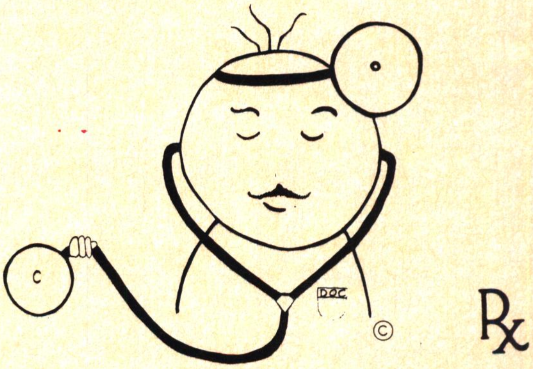

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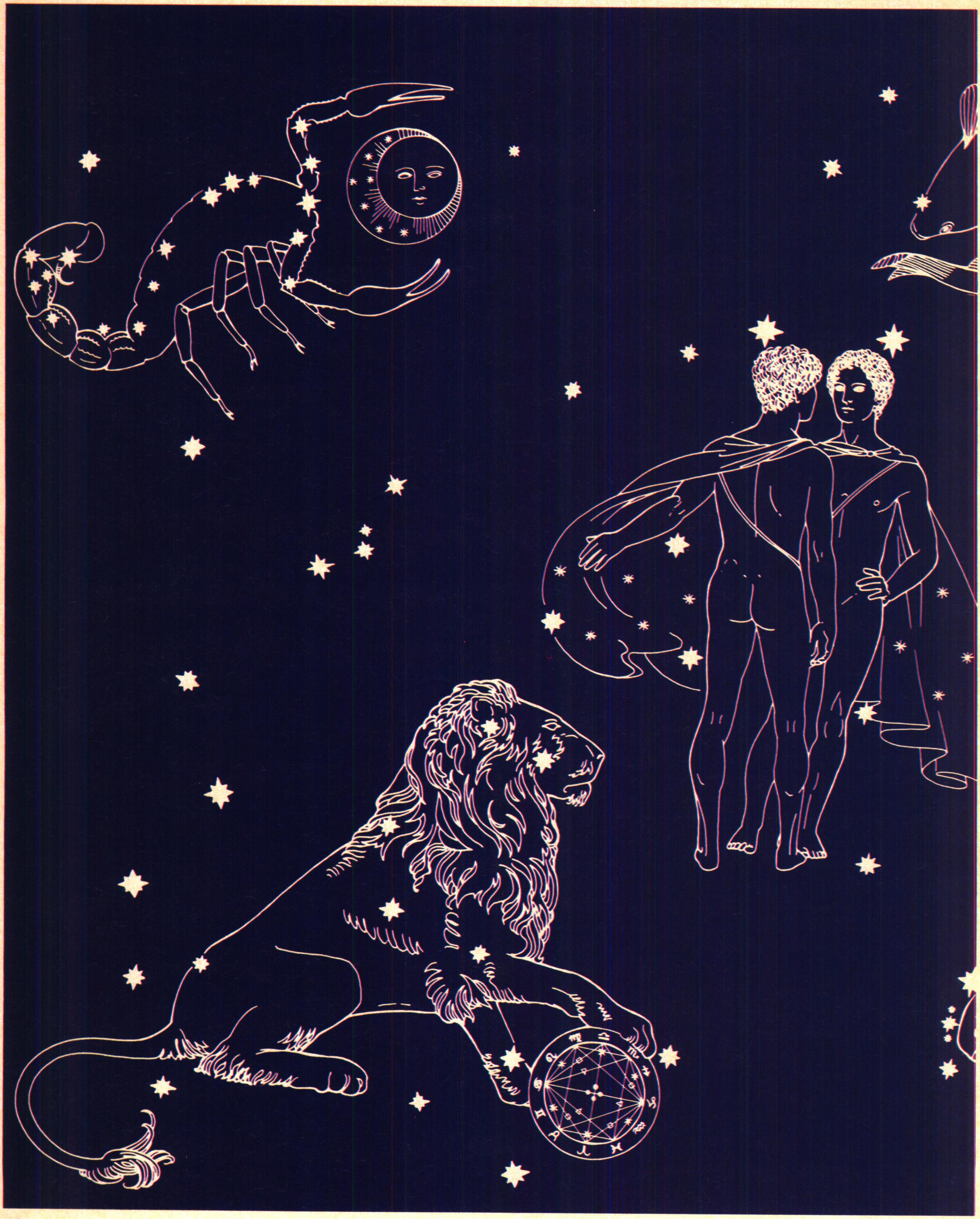
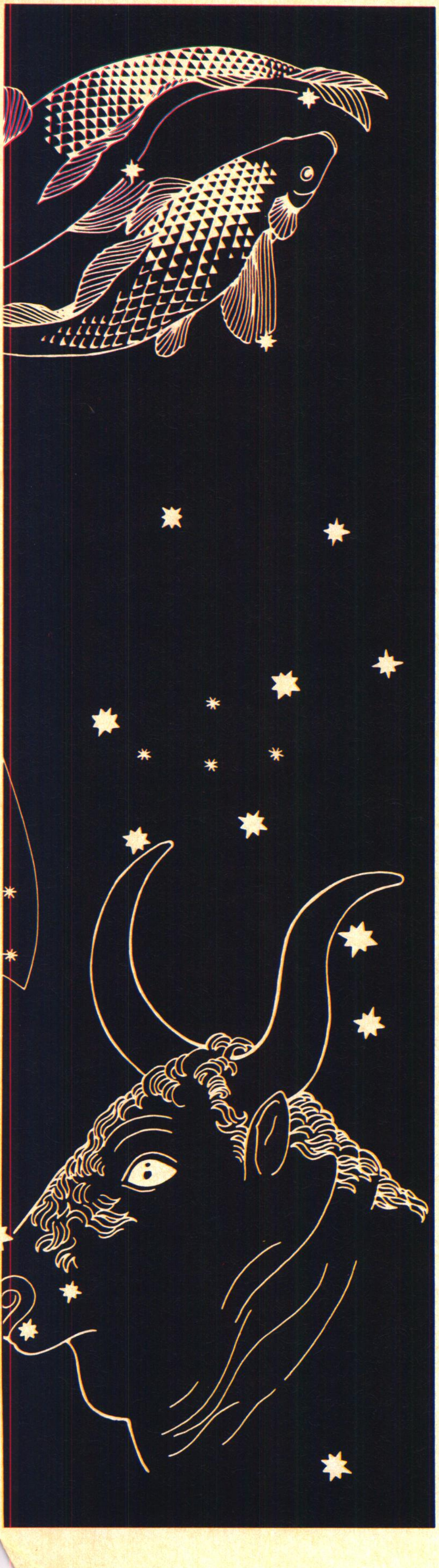


32K
ECB



How To Be An Educated Stargazer In 12 Easy Lessons

Starfinder familiarizes you with information on selected constellations, and draws them on CoCo's screen, as well

By Eugene Vasconi

Have you ever stood outside under the night sky staring into the heavens while trying to remember what your science teacher said about finding constellations? Then you get frustrated because you can't even find the "Big Dipper."

Starfinder is designed to accurately display 12 of the more picturesque constellations in the night sky. In addition, the data option provides information on each constellation, including alternate names, selected member stars and comments on the mythological figures ancients used to describe them. "Scorpius," for example, was depicted as a scorpion and both claws and tail are labeled. Finally, a `LINE` command is available to connect each star and make the figure more apparent.

Selecting number 13 on the menu, Dippers, displays the Big and Little Dippers on the star field for use in visualizing their relative positions. Press 'D' and the computer will show you how the two are related by distance and angle.

In assembling star coordinates, I have maintained as great an accuracy with member stars as is possible given the graphics area available. Size is the only variable and one constellation versus another might not be an accurate comparison. "Pegasus," for example, displayed much clearer as a tight figure than spread out. However, when using *Starfinder* to help you locate actual constellations, you will find it quite realistic.

Actual constellations are not necessarily made up of the brightest stars. I have included an intensity option which allows you to choose a more realistic display of somewhat dim member stars or one that would make them stand out. Selecting this option at the beginning will cause all stars displayed to be in that mode.

A large part of the program is made up of Hi-Res labels and it is worth mentioning the technique. I have elaborated on a system Mike

---

(Eugene Vasconi is a free-lance television producer/director who is also active in aviation as a commercial helicopter pilot. His computer interests center in the areas of graphics, music and education. He has been a CoCoer for nearly four years.)

Hall used in his *Trailin' Tail* program (RAINBOW, August 1983) which displays Hi-Res words by detecting their ASCII equivalent. (I heartily recommend this way if you find a program needs a lot of wording on the graphics screen.) In *Starfinder* this system consists of lines 3, 110, 111, 113-149, plus individual draw coordinates and GOSUBs for the particular label.

Starfinder is not a game but a learning tool for both students and those of us who have forgotten our planetarium visits. I think a few sessions with the program will make our stargazing much more enjoyable.

A final comment for those who might be curious about the connect sequence: I discovered that while DATA statements were fine for the display of the stars alone, this was unsatisfactory for connecting them with lines since each constellation has its own peculiar design. The easiest solution was to create a central universal line routine that could be joined in progress at various positions according to how many stars were involved, then, by assigning the variables array designations, the lines would draw properly. Loops were set up to take care of as many lines as possible (lines 49-57).

(For any questions regarding *Starfinder*, you may contact Mr. Vasconi at 8301 N. Council, Apt. 1204, Oklahoma City, OK 73132, phone 405-722-1978.)

Program Summary

Lines 3 - 12	Title screen and array loading
Line 14	Intensity selection
Lines 15 - 19	Menu and sort routine
Lines 21 - 26	Star display routine
Lines 28 - 40	Array parameters for display routine
Lines 42 - 45	Data and sort routine
Lines 46 - 59	Connecting sequence
Lines 61 - 108	Label information for data option
Lines 110 - 111	Label subroutine
Lines 113 - 149	Letters/numbers data
Lines 151 - 176	Star coordinates data
Lines 178 - 206	Connecting sequence information

12	209	106	196
24	187	118	230
44	87	148	190
60	201	163	89
71	191	177	3
83	56	END	150
93	248		

The listing: STARFIND

```
1 CLEAR200
2 ' **TITLE SCREEN **
3 DIM LT$(43):FORX=1TO43:READ LT
$(X):NEXTX:DIMST(165),SR(165)
4 PMODE4:PCLS:SCREEN1,1:DRAW"BM1
1,30;C1;S16":N$="STARFINDER":GOS
UB110
5 FORTP=1TO15:PLAY"V31":FORTQ=1T
O4:R=RND(255):S=RND(196):PLAY"L1
1T31V<;3;4;5;6;7":PSET(R,S):NEXT
TQ,TP
6 FORTC=1TO30:PLAY"T250L250V15O1
CG":CIRCLE(125,90),TC:NEXTTC
7 DRAW"BM80,150;C1;S4":N$="BY EU
GENE VASCONI":GOSUB110
8 FORTX=45TO60STEP2:CIRCLE(125,9
0),TX,,.3,.83,.68:NEXTTX
9 DRAW"BM10,190;C1;S4":N$="LOADI
NG":GOSUB110
10 FORTL=1TO165:READST(TL),SR(TL
):PLAY"L54T18O4;1;8":NEXTTL
11 DRAW"BM10,190;C0":N$="LOADING
":GOSUB110:DRAW"BM10,190;C1":N$=
"PRESS ANY KEY TO BEGIN":GOSUB11
0
12 CIRCLE(125,90),60,1,.3,.83,.6
8:IN$=INKEY$:CIRCLE(125,90),60,0
,.3,.83,.68:PLAY"L255T255O5GG#":
IF IN$=""THEN12
13 ' ** INTENSITY SELECTION **
14 CLS(0):PRINT@99,"STAR INTENSI
TY SELECTION":PRINT:PRINT"(1) WI
LL CREATE MORE REALISTIC  STAR P
ATTERNS":PRINT:PRINT"(2) WILL EM
PHASIZE STARS":PRINT:INPUT"SELEC
T (1) OR (2)";SS:IF SS<1 OR SS>2
 THEN14
15 CLS:SOUND200,1 '**MENU PAGE*
16 PRINT@5,"]]] constellations [
[[":PRINT:PRINT"(1)  TAURUS":PRI
NT"(2)  ORION":PRINT"(3)  URSA M
INOR":PRINT"(4)  GEMINI":PRINT"(
5)  CANUS MAJOR":PRINT"(6)  LEO"
:PRINT"(7)  URSA MAJOR"
17 PRINT"(8)  SCORPIUS":PRINT"(9
)  CYGNUS":PRINT"(10) PEGASUS":P
RINT"(11) PISCES":PRINT"(12) CAS
SIOPEIA":PRINT"(13) THE DIPPERS"
18 INPUT"                   select
ion ";SL:PLAY"V31":FORLP=1TO4:PL
AY"L11T31V<;O5;3;4;5;6;7;8;9;10"
:NEXTLP:IF SL<1OR SL>13 THEN15
19 PLAY"V15":ON SL GOSUB28,29,30
,31,32,33,34,35,36,37,38,39,40
20 '**** DISPLAY SEQUENCE******
21 PMODE4:PCLS:SCREEN1,1:
22 FORY=1TO150:R=RND(255):S=RND(
196):PSET(R,S):NEXTY
```

```
23 FORCC=W TO Z:CIRCLE(ST(CC),SR
(CC)),SS:PLAY"L54T18O4;1;8;1;8;1
;8":NEXTCC
24 DRAW"BM10,190;S4;C1":N$="M FO
R MENU OR D FOR DATA":GOSUB110
25 RT$=INKEY$:IF RT$="M" THEN15E
LSE26
26 IF RT$="D"THEN42ELSE25
27 'VARIABLES
28 W=1:Z=12:CD=1:RETURN
29 W=13:Z=26:CD=2:RETURN
30 W=27:Z=33:CD=3:RETURN
31 W=34:Z=49:CD=4:RETURN
32 W=50:Z=63:CD=5:RETURN
33 W=64:Z=78:CD=6:RETURN
34 W=79:Z=94:CD=7:RETURN
35 W=95:Z=110:CD=8:RETURN
36 W=111:Z=118:CD=9:RETURN
37 W=119:Z=131:CD=10:RETURN
38 W=132:Z=146:CD=11:RETURN
39 W=147:Z=151:CD=12:RETURN
40 W=152:Z=165:CD=13:RETURN
41 ' ** DATA SELECTOR **
42 PLAY"L100T8O4AB-O2B-BO1C#D":D
RAW"BM10,190;S4;C0":N$="M FOR ME
NU OR D FOR DATA":GOSUB110
43 PLAY"L6T40O2;1;8;1;8;1;8":ON
CD GOSUB61,64,68,71,74,77,81,84,
87,91,95,99,103
44 DRAW"BM10,190;S4;C1":N$="M FO
R MENU   L TO CONNECT":GOSUB110
45 RT$=INKEY$:IF RT$="M" THEN15E
LSE46
46 IF RT$="L" THEN47ELSE45
47 PLAY"L255O3GG#O4GG#O5GG#":ON
CD GOTO178,180,182,184,186,189,1
91,194,196,198,200,203,205
48 ' **CONNECTION SEQUENCE**
49 LINE(ST(M),SR(M))-(ST(N),SR(N
)),PSET:LINE-(ST(P),SR(P)),PSET
50 LINE(ST(Q),SR(Q))-(ST(R),SR(R
)),PSET:LINE-(ST(S),SR(S)),PSET
51 IF SK=3THEN56
52 LINE(ST(T),SR(T))-(ST(U),SR(U
)),PSET
53 IF SK=1THEN 57
54 LINE(ST(V),SR(V))-(ST(W),SR(W
)),PSET
55 IF SK=2THEN57
56 FORLP=GG TO HH:PLAY"L255O4B-B
C":LINE(ST(LP),SR(LP))-(ST(LP+1)
,SR(LP+1)),PSET:NEXTLP
57 FORLP=G TO H:PLAY"L255O4B-BC"
:LINE(ST(LP),SR(LP))-(ST(LP+1),S
R(LP+1)),PSET:NEXTLP
58 DRAW"BM10,190;S4;C0":N$="M FO
R MENU   L TO CONNECT":GOSUB110:
DRAW"BM10,190;C1":N$="M FOR MENU
":GOSUB110
```

```
59 A$=INKEY$:IF A$="M" THEN 15 E
LSE 59
60 '**STAR DATA**
61 DRAW"BM105,30;S16;C1":N$="TAU
RUS":GOSUB110:DRAW"BM199,45;S4":
N$="THE BULL":GOSUB110
62 DRAW"BM43,96;S4":N$="ALDEBARA
N":GOSUB110:DRAW"BM14,35;S4;C1":
N$="HORNS":GOSUB110:DRAW"BM176,1
40;S4;C1":N$="LEGS":GOSUB110
63 RETURN
64 DRAW"BM15,28;S16;C1":N$="ORIO
N":GOSUB110:DRAW"BM135,10;S4":N$
="THE HUNTER":GOSUB110
65 DRAW"BM159,138;S4":N$="RIGEL"
:GOSUB110:DRAW"BM190,63":N$="ARM
":GOSUB110
66 DRAW"BM82,109;S4;C1":N$="BELT
":GOSUB110:DRAW"BM66,52":N$="ARM
":GOSUB110
67 RETURN
68 DRAW"BM125,20;S8;C1":N$="URSA
 MINOR":GOSUB110:DRAW"BM170,32;S
4":N$="LITTLE BEAR":GOSUB110:DRA
W"BM158,42":N$="LITTLE DIPPER":G
OSUB110
69 DRAW"BM51,52;S4;C1":N$="POLAR
IS":GOSUB110:DRAW"BM188,117":N$=
"HEAD":GOSUB110:DRAW"BM40,100;S4
":N$="TAIL":GOSUB110
70 RETURN
71 DRAW"BM19,135;S8;C1":N$="GEMI
NI":GOSUB110:DRAW"BM27,150;S4":N
$="THE TWINS":GOSUB110
72 DRAW"BM6,43;S4":N$="POLLUX":G
OSUB110:DRAW"BM32,16":N$="CASTOR
":GOSUB110
73 RETURN
74 DRAW"BM11,20;S8;C1":N$="CANUS
":GOSUB110:DRAW"BM11,35":N$="MAJ
OR":GOSUB110
75 DRAW"BM12,47;S4":N$="GREAT DO
G":GOSUB110:DRAW"BM149,43;S4":N$
="SIRIUS":GOSUB110:DRAW"BM197,66
":N$="MIRZAM":GOSUB110
76 RETURN
77 DRAW"BM11,30;S16;C1":N$="LEO"
:GOSUB110:DRAW"BM84,18;S8":N$="T
HE LION":GOSUB110
78 DRAW"BM157,88;S4;C1":N$="ALGI
EBA":GOSUB110:DRAW"BM177,140":N$
="REGULUS":GOSUB110
79 DRAW"BM204,55":N$="HEAD":GOSU
B110:DRAW"BM14,115":N$="TAIL":GO
SUB110
80 RETURN
81 DRAW"BM9,20;S8;C1":N$="URSA M
AJOR":GOSUB110
82 DRAW"BM10,30;S4":N$="GREAT BE
```

```
AR":GOSUB110:DRAW"BM26,100;S4":N
$="BIG DIPPER":GOSUB110:DRAW"BM1
53,100":N$="MERAK":GOSUB110:DRAW
"BM109,65":N$="DUBHE":GOSUB110
83 RETURN
84 DRAW"BM9,20;S8;C1":N$="SCORPI
US":GOSUB110
85 DRAW"BM101,54;S4":N$="ANTARES
":GOSUB110:DRAW"BM25,115":N$="SC
HAULA":GOSUB110:DRAW"BM200,52":N
$="CLAWS":GOSUB110:DRAW"BM26,150
":N$="TAIL":GOSUB110
86 RETURN
87 DRAW"BM9,15;S8;C1":N$="CYGNUS
":GOSUB110
88 DRAW"BM10,25;S4":N$="THE SWAN
":GOSUB110:DRAW"BM10,35":N$="NOR
THERN CROSS":GOSUB110
89 DRAW"BM107,53":N$="DENEB":GOS
UB110:DRAW"BM127,87":N$="SADR":G
OSUB110:DRAW"BM186,166":N$="HEAD
":GOSUB110:DRAW"BM190,50":N$="WI
NG":GOSUB110:DRAW"BM44,135":N$="
WING":GOSUB110
90 RETURN
91 DRAW"BM9,20;S8;C1":N$="PEGASU
S":GOSUB110:DRAW"BM104,15;S4":N$
="WINGED HORSE":GOSUB110
92 DRAW"BM119,66":N$="MARKAB":GO
SUB110:DRAW"BM117,120":N$="SCHEA
T":GOSUB110:DRAW"BM171,82":N$="A
LGENIB":GOSUB110
93 DRAW"BM44,59":N$="HEAD":GOSUB
110:DRAW"BM16,125":N$="FRONT LEG
S":GOSUB110
94 RETURN
95 DRAW"BM9,20;S8;C1":N$="PISCES
":GOSUB110:DRAW"BM90,15;S4":N$="
THE FISHES":GOSUB110
96 DRAW"BM27,115;S4":N$="ALRISCH
A":GOSUB110:DRAW"BM126,58":N$="F
ISH":GOSUB110:DRAW"BM190,115":N$
="FISH":GOSUB110
97 DRAW"BM40,155":N$="FISH ARE C
ONNECTED BY A ROPE":GOSUB110
98 RETURN
99 DRAW"BM9,30;S16;C1":N$="CASSI
OPEIA":GOSUB110
100 DRAW"BM189,108;S4":N$="CAPH"
:GOSUB110:DRAW"BM151,137":N$="SC
HEDIR":GOSUB110
101 DRAW"BM138,110":N$="TORSO":G
OSUB110:DRAW"BM8,100":N$="KNEE O
F WOMAN":GOSUB110:DRAW"BM22,110"
:N$="ON THRONE":GOSUB110
102 RETURN
103 DRAW"BM10,104;S4;C1":N$="LIT
TLE DIPPER":GOSUB110:DRAW"BM158,
140":N$="BIG DIPPER":GOSUB110
104 DRAW"BM39,28;":N$="POLARIS":
GOSUB110:DRAW"BM192,60":N$="POIN
TERS":GOSUB110
105 FOREX=1TO20:PLAY"L255O2CC#":
LINE(180,74)-(200,62),PSET:LINE-
(196,80),PSET:FOREY=1TO50:NEXTEY
:COLOR1:LINE(180,74)-(200,62),PS
ET:LINE-(196,80),PSET:COLOR0:NEX
TEX
106 FOREX=1TO15:LINE(174,76)-(91
,28),PSET:COLOR0:FOREY=1TO50:NEX
TEY:LINE(174,76)-(91,28),PSET:CO
LOR1:PLAY"L250T250V-O4;1;3;1;3":
NEXTEX:PLAY"V15"
107 LINE(93,25)-(155,25),PSET:LI
NE-(173,73),PSET:PLAY"L40T2O5ABA
":DRAW"BM156,10;S4;C1":N$="5 TIM
ES":GOSUB110:DRAW"BM140,20":N$="
POINTER DISTANCE":GOSUB110
108 RETURN
109 ' **LABEL SUBROUTINE**
110 L=LEN(N$):FORZ=1TOL:M=ASC(MI
D$(N$,Z,1))-47:IFM=-15THENDRAW"B
R4"ELSEDRAWLT$(M)
111 PLAY"L255T255O5V15BC":DRAW"B
R2":NEXT:RETURN
112 ' **LETTER DATA**
113 DATABRHU4ERFD4GNLBR2
```

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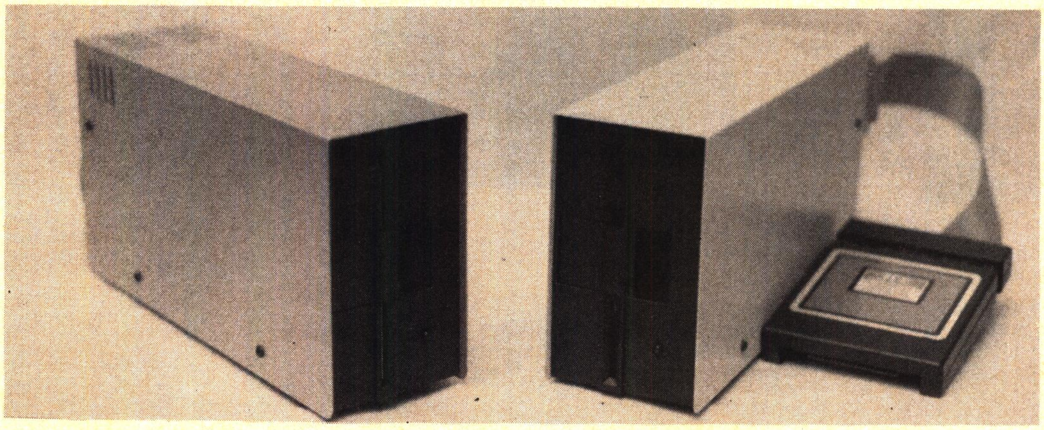

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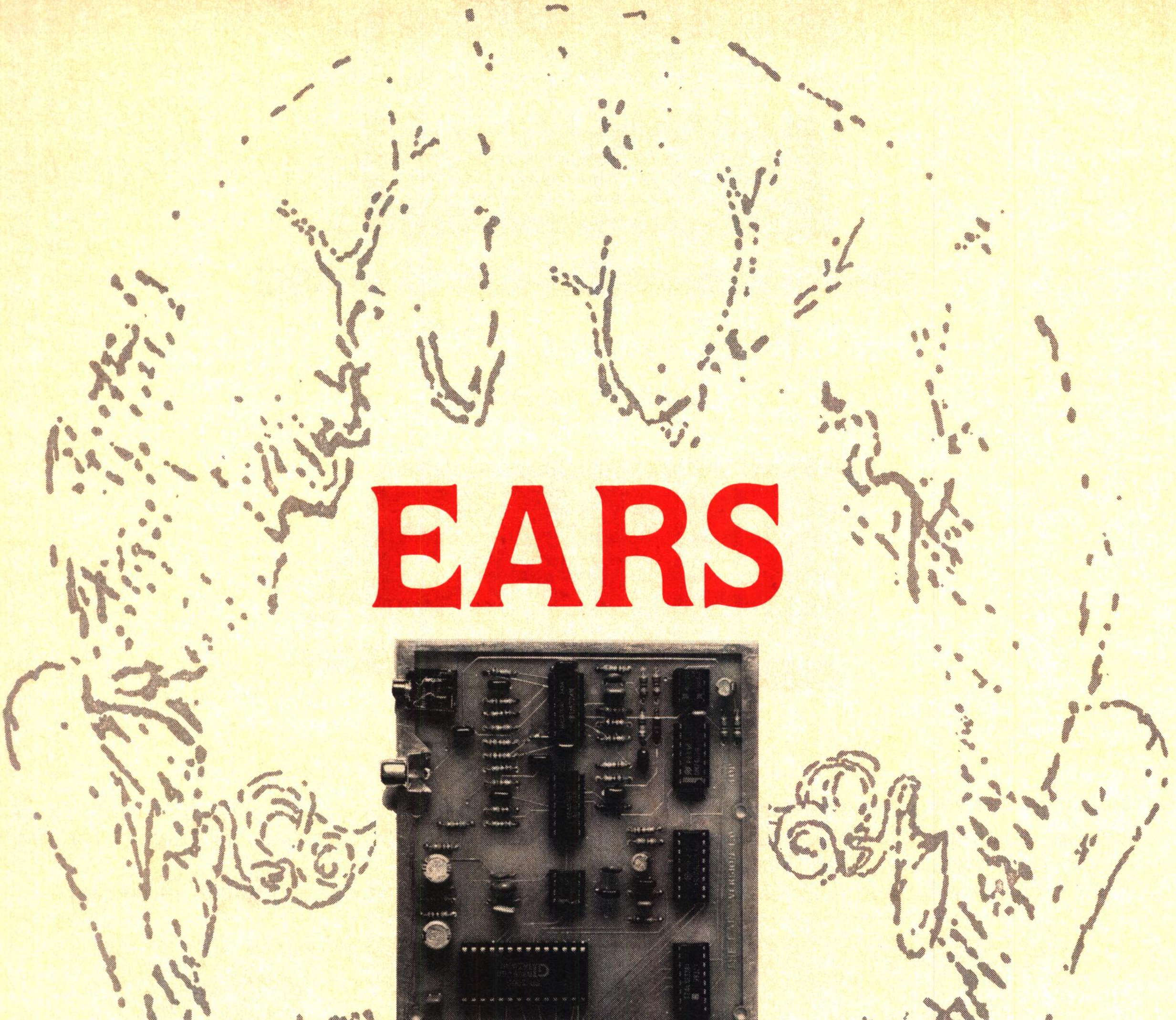

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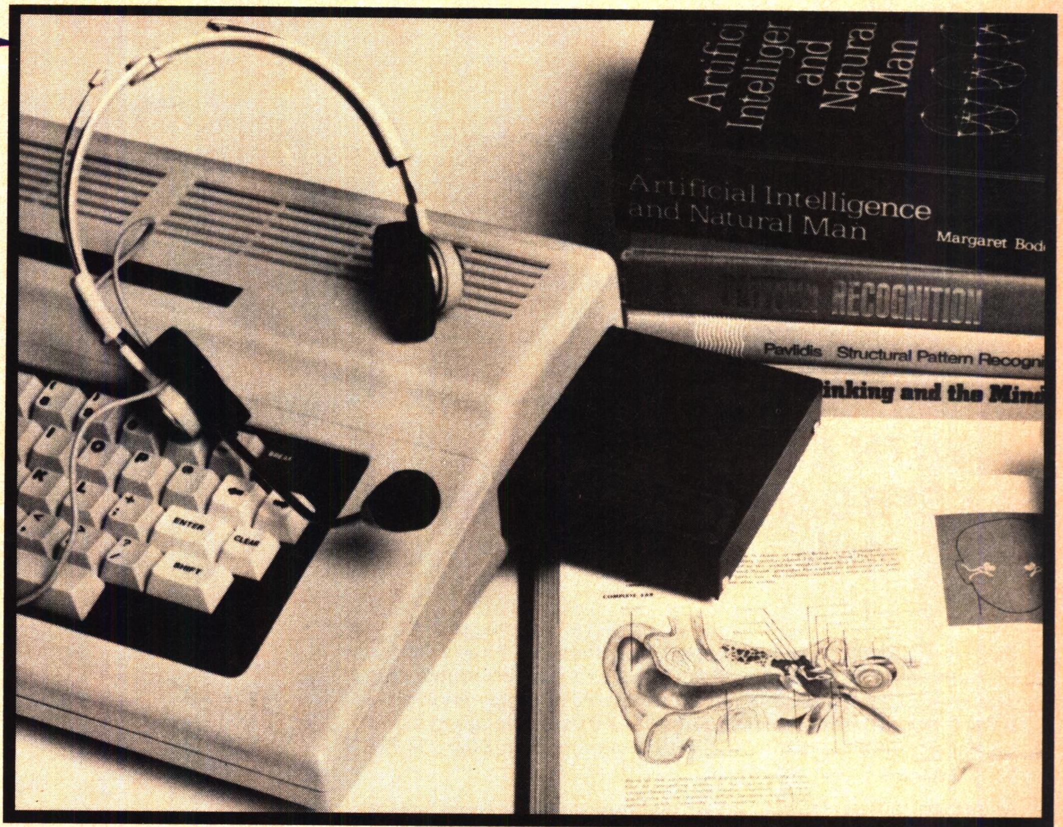
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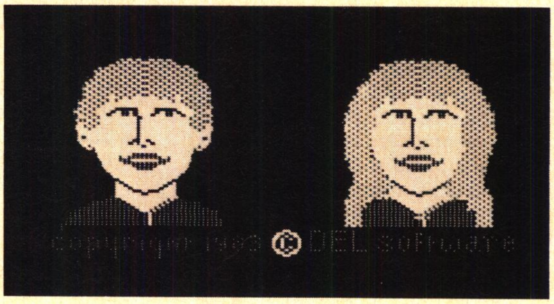

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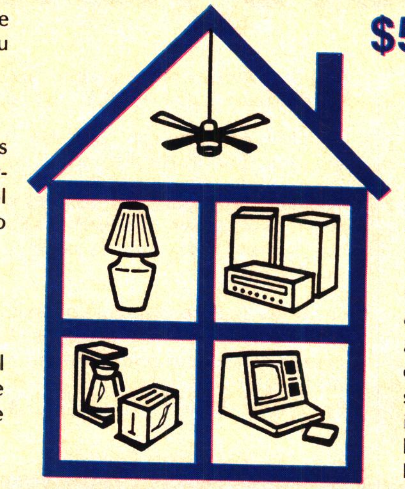

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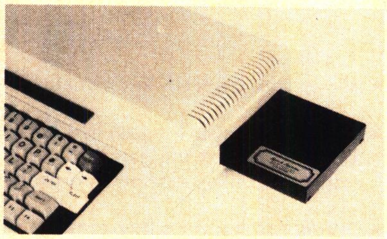

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SPEECH & SOUND PAK

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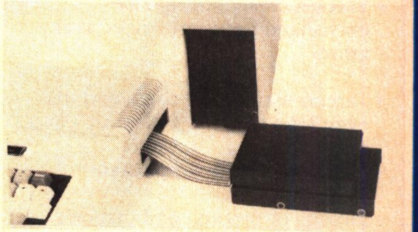
The PRECISON TIME MODULE automatically adjusts for the different number of days in each month as well as leap years. And believe it or not, it adjusts for DST so you don't have to remember if it's SPRING FORWARD or FALL FORWARD.

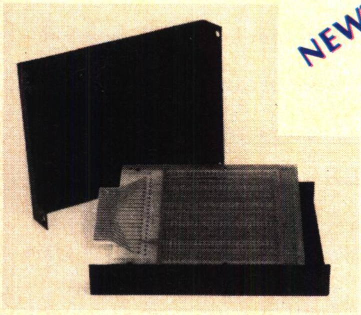
Y-CABLE $28.95

Why pay $100 to $200 for a multi-pak. With the Y-CABLE, you can connect your disk system to your computer along with either our STEREO PAK music synthesizer, our VOICE, SUPER VOICE speech synthesizers, or our PRECISION TIME MODULE. All connectors gold plated.

TRIPLE Y $34.95

We developed the Triple Y-Cable specifically for those interested in both speech synthesis and speech recognition. The Triple Y-Cable lets you connect EARS and SUPER VOICE to your color computer along with your disk system.





NEW! ATTENTION EXPERIMENTERS!

Interested in building your own project? Our oversized board gives plenty of room for construction while the sturdy aluminum case with black satin finish assures protection and a professional appearance.

Prototype Board only $19.95
Prototype Enclosure only $19.95
Buy both for $29.95

Advanced
Speech
Chip
SSI-263
(SC-02)
$34.95

Need an SC-01? $29.00

Disks	(any quantity)	$1.49
Tape C-10, C-20		$0.69
Hard Tape Box		$0.29
6821		$2.95
74LS138		$0.79
7407		$0.79
IC sockets 14, 16, 22 pin		$0.29
IC sockets 24, 28, 40		$0.39

FREE
BLANK DISK
OR TAPE
WITH EVERY
ORDER

VISA® MasterCard

Dealer Inquiries
Invited

We accept CASH, CHECK, COD, VISA and MASTER CARD orders.

Shipping and handling US and Canada	$3.00
Shipping and handling outside the US and Canada	$5.00
COD charge	$2.00

Illinois residents add 6¼% sales tax

Speech Systems

38W 255 DEERPATH ROAD
BATAVIA, ILLINOIS 60510
(312) 879-6880 (VOICE)
1 MEGABYTE COLORAMA **(312) 879-6811 (24 HR. BBS)**

CALL ANY DAY TO ORDER. ALSO ORDER BY MAIL OF BBS.

FOR
MUSICA 2
and
SUPER VOICE

♫ PIANO KEYBOARD ♫

The best music composition program, MUSICA 2, and most advanced speech/sound synthesizer, SUPER VOICE, just got better.

Imagine, now you can compose music with MUSICA 2 by inputting notes via a real piano keyboard. Hit A# and MUSICA 2 instantly displays the note.

The same keyboard can be used with SUPER VOICE to give you a real monophonic music synthesizer. The PIANO KEYBOARD comes in a 2½ and 4 octave version. They are not toys. They are the same style, shape, size, and feel you find in professional synthesizers.

Included is an enhanced command which gives MUSICA 2 (sold separately) piano keyboard input. Also included is SUPER SYNTH, a program which turns SUPER VOICE (see $20 off special offer) into a Super Synthesizer. Disk owners must use a Y-CABLE or Multi-Pak.

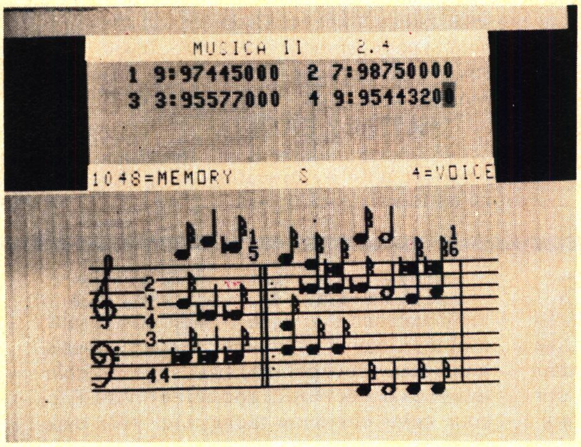
2½ octave (32 note) .... **$79.95** 4 octave (49 note) **$119.95**

shipping $8.00

MUSICA 2 $29.95

Tape or Disk

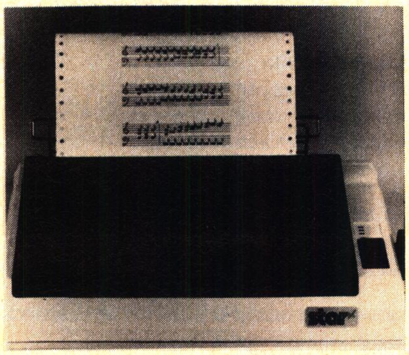
- When in stereo mode, music is played through our STEREO PAK (purchased separately).
- Loudness of each voice may be individually specified.
- Memory available is constantly displayed.
- Voice waveshapes may be exchanged between voices at any point.
- Tempo may be specified and may even be altered as the music plays.
- Flats and sharps supported.
- Billions of timbre combinations.
- High resolution graphic display, looks just like sheet music.
- MUSICA 2 is 100% software, no need for hardware unless you want music produced in STEREO. In that case, the STEREO PAK may be purchased separately. It's a must for the audiophile!
- Repeat bars allow repeating of music without re-inserting music a second or third time.
- 30 page manual describes all.
- Requires minimum of 32K.



```
        MUSICA II      2.4
   1 9:97445000  2 7:98750000
   3 3:95577000  4 9:95443200

1048=MEMORY        S          4=VOICE
```

- Output music to your printer (Gemini 10X, Epson, R.S. printers).



- Allows you to specify key signature.
- Voice timbre (waveshape) may be altered by specifying harmonic content just like stops on an organ.
- During editing, voice being inserted is displayed.
- Each measure is numbered for easy reading of music.
- Measure bars aid in reading and developing music.
- Each voice may be visually highlighted for easy identification.
- 4 Voices produced simultaneously.
- Input notes from Coco keyboard, joystick, or Piano Keyboard.
- Play music from your own BASIC program.
- Block copy music for easy music development.
- 100% machine language so it is lightning fast.
- Vibrato effect easily produced.
- With STEREO PAK, voices may be switched between left and right speakers as music plays.
- Durations include: whole, half, quarter, eighth, sixteenth, thirty-second, sixty-fourth, and triplet.

♫ ♫ MUSIC THEORY ♫ ♫

An advanced music course that covers Major and Harmonic Minor scales, interval spelling, Triad (Chord) theory, Inversions, Dominant 7th chords, and interval ear training. Format of the course includes drill and practice sessions, a scorecard to measure progress, graphics and sound output, and a reviewing session.

32K Disk only **$49.95**

NEW! STEREO PAK™ $39.95

Plug this gem into your computer, connect to your nome stereo system and sit back and enjoy music realism. The STEREO PAK is a hardware music synthesizer that plays our MUSIC LIBRARY and MUSICA 2 music in stereo. Because it was designed specifically with music reproduction in mind, the sound is superb. The highs are crisp and clear while the bass notes will rattle your walls.

The STEREO PAK is all hardware. It is intended as an enhancement for MUSICA 2 and our MUSIC LIBRARY. Disk owners may use the STEREO PAK with the R.S. Multi-Pak or our Y-CABLE ($28.95)

New!
NOW "PLAY"
AND "SOUND"
COMMANDS COME
THRU THE
STEREO PAK
Requires 64K

NEW! MUSIC LIBRARY™ — 3 VOLUMES

10 HOURS OF MUSIC

BUY 2 GET 3rd FREE

You get over 100 four voice songs with a combined playing time of 3 hours. That's right, 3 hours of music. You won't belive your CoCo could sound so good. To fit over 100 songs required both sides of 5 C-20 tapes and the disk version uses 5 full disks (that's a half box of disks).

A JUKE BOX selection program is included to allow you to select specific songs or automatically play each. These songs are ready to go, you don't need MUSICA 2 or a knowledge of music.

These songs were developed using the best music program available for the CoCo; MUSICA 2. The tunes may be used as source files for MUSICA 2 and changed by the user. When coupled with the STEREO PAK the songs are reproduced in stereo with unsurpassed realism.

MUSIC LIBRARY 100 categories:

Stage, Screen, and TV
Music of the 70's
Music of the 60's
Music of the 50's
Old Time Favorites
Classical
Christmas (popular)
Christmas (traditional)
Patriotic
Polka Party

MUSIC LIBRARY 200
Our second volume of 100 tunes, 3½ hours of music.

MUSIC LIBRARY 300
Our third volume of 100 tunes, 3 more hours of music.

MUSIC LIBRARY (Each Volume) . . (32K Tape) . . . **$34.95**
(Specify 100, 200, or 300) (32K Disk) **$39.95**

SPEECH SYSTEMS DATAPEN $29.95

$5.00 OFF With Any Educational Software Program

Two programs are provided free with each DATAPEN. SKETCH is a superb high resolution color drawing program allowing precise drawing and freehand sketching, painting and much more. SHAPE CREATE is a high resolution library shape drawing program. You can even save your work to tape or disk for later display or editing.

The software is shipped on tape and may easily be moved to disk. Included is complete documentation to allow you to integrate the DATAPEN into your own BASIC program.

Requires 32K.

EASY TO USE!

EDUCATIONAL SOFTWARE

An easy and fun way for kids to enter answers.

Vol. 1 — grades 1, 2, and special education.

Includes these five programs:
- Basic Addition
- Basic Multiplication
- Match the Shapes
- Match the Numbers
- Rhyme the Words

32K disk **$29.95**

Vol. 2 — grades 3 to 6 and special education

Includes these five programs:
- Men of Science
- Mixed Math
- World Capitals
- Computer Terms
- 20th Century Events

32K disk **$29.95**

FREE BLANK DISK OR TAPE WITH EVERY ORDER

VISA MasterCard

Dealer Inquiries Invited

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Shipping and handling US and Canada	$3.00
Shipping and handling outside the US and Canada	$5.00
COD charge	$2.00

Illinois residents add 6¼% sales tax

Speech Systems

38W 255 DEERPATH ROAD
BATAVIA, ILLINOIS 60510
(312) 879-6880 (VOICE)
1 MEGABYTE COLORAMA **(312) 879-6811 (24 HR. BBS)**

CALL ANY DAY TO ORDER. ALSO ORDER BY MAIL OF BBS.

```
114 DATAR2U6NGD6R2
115 DATABU5ER2FDGL2GD2R4
116 DATABU5ER2FDGNLFDGL2NHBR3
117 DATABR3U6G3R4BD3
118 DATABUFR2EU2HL3U2R4BD6
119 DATABU3R3FDGL2HU4ER2BD6BR
120 DATABU6R4DG3D2BR3
121 DATABRHUER2EUHL2GDFR2FDGNL2B
R
122 DATABRR2EU4HL2GDFR3BD3
123 DATABR4,BR4,BR4,BR4,BR4,BR4,
BR4
124 DATAU5ER2FD2NL4D3
125 DATARU6NLR2FDGNL2FDGNL3BR
126 DATABR4BU5HL2GD4FR2EBD
127 DATARU6NLR2FD4GNL2BR
128 DATAU6NR4D3NR3D3R4
129 DATAU3NR3U3R4BD6
130 DATABUU4ER3BD4NLD2L3NHR3
131 DATAU3NU3R4NU3D3
132 DATAR2U6NL2NR2D6R2
133 DATABUNUFR2ENU5BD
134 DATAU3NU3RNE3F3
135 DATANU6R4
136 DATAU6F2DUE2D6
137 DATAU6F4NU4D2
138 DATABRHU4ER2FD4GNL2BR
139 DATAU6R3FDGL3D3BR4
```

GRAFPLOT

TRY IT BEFORE YOU BUY IT!!

FREE!!
DEMO!!

TEST DRIVE GRAFPLOT IN YOUR OWN HOME, ABSOLUTELY FREE!! YOU'LL WONDER HOW YOU EVER GOT ALONG WITHOUT IT!!

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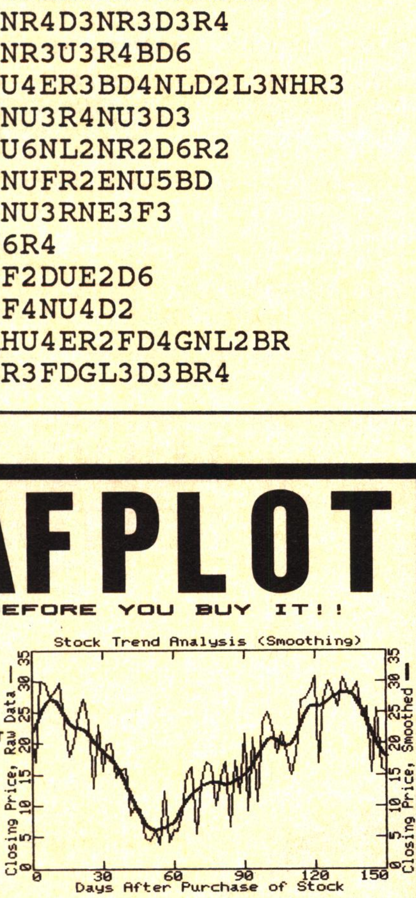

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A great package gets even better ... totally impressed ... equally useful in the home and office ... meticulous, hand-holding documentation ... very easy to use" RAINBOW, 6/84 & 7/83
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- * Easy to Use, Menu-Driven Operation with 37 Page Manual.
- * Nine Graphing Symbols and Unlimited Overlay of Data Sets.
- * Automatically Scales and Labels *All Three* of the Axes.
- * Calculates Math Functions, Integrals and Moving Averages.
- * Works with all CoCo models - requires Extended BASIC.

16K TAPE - $35.00, 32K TAPE - $40.00, 32K DISK - $45.00 (US)

ASK YOUR DEALER FOR GRAFPLOT OR ORDER DIRECT FROM:
HAWKES RESEARCH SERVICES, 859 STANFORD AVE, OAKLAND, CA 94608
YOUR PERSONAL CHECK IS WELCOME! SHIPMENT WITHIN 48 HOURS!
$3.00 SHIPPING ON ALL ORDERS. CA. RESIDENTS ADD SALES TAX.

```
140 DATABRHU4ER2FD4GNL2BUHF2
141 DATAU6R3FDGL3RF3
142 DATABUFR2EUHL2HUER2FBD5
143 DATABU6R4L2D6BR2
144 DATABUNU5FR2ENU5BD
145 DATABU6D4F2E2U4BD6
146 DATANU6E2UDF2NU6
147 DATAUE4NUG2H2NUF4D
148 DATABU6DF2E2NUG2D3BR2
149 DATABU6R4DG4DR4
150 ' **STAR POSITIONS**
151 'TAURUS
152 DATA40,52,96,84,112,84,140,1
00,184,96,108,76,102,68,52,20,19
2,112,144,136,120,120,100,112
153 'ORION
154 DATA176,36,183,56,184,64,183
,68,180,84,140,68,128,52,100,60,
116,104,124,100,132,95,152,132,1
08,140,88,48
155 'URSA MINOR
156 DATA43,48,61,78,89,107,134,1
19,135,142,180,140,179,114
157 'GEMINI
158 DATA44,49,62,61,92,105,124,1
18,183,156,164,186,77,52,42,80,7
0,18,82,20,115,36,168,80,232,102
,201,122,152,6,84,54
159 'CANUS MAJOR
160 DATA120,180,104,148,98,138,8
6,125,118,108,157,70,141,45,124,
6,102,34,98,104,190,60,182,166,7
3,128,53,150
161 'LEO
162 DATA14,150,66,106,84,104,150
,66,192,34,203,44,228,41,231,18,
59,172,73,134,184,125,173,100,24
4,130,149,88,145,160
163 'URSA MAJOR
164 DATA15,95,44,80,70,84,96,84,
110,101,149,90,146,67,198,43,236
,37,197,63,224,89,248,90,249,98,
156,149,204,176,207,160
165 'SCORPIUS
166 DATA74,120,61,133,54,141,70,
161,98,156,114,144,114,118,116,1
00,138,66,148,56,191,19,195,36,1
92,60,188,75,162,54,69,120
167 'CYGNUS
168 DATA99,47,114,79,139,108,173
,160,182,23,163,59,74,106,32,118
169 'PEGASUS
170 DATA83,125,103,114,115,108,1
57,110,164,72,114,71,101,66,96,6
3,80,57,64,106,76,103,103,95,105
,98
171 'PISCES
172 DATA81,107,92,91,100,78,104,
69,110,58,111,46,104,54,116,95,1
```

```
25,96,154,96,167,98,175,95,183,1
02,178,107,167,106
173 'CASSIOPEIA
174 DATA66,61,91,95,124,93,144,1
29,181,102
175 'DIPPERS
176 DATA89,26,80,38,73,52,76,68,
67,74,78,89,84,82,133,162,138,13
8,151,126,166,110,183,112,194,85
,176,76
177 '***CONNECT INFO***
178 M=9:N=5:P=10:Q=11:R=4:S=12:T
=3:U=6:SK=1:G=1:H=7
179 GOTO49
180 Q=25:R=21:S=20:T=20:U=26:V=2
3:W=18:SK=2:G=13:H=23
181 GOTO50
182 V=30:W=33:G=27:H=32:SK=2
183 GOTO54
184 M=40:N=35:P=41:Q=48:R=43:S=4
9:T=39:U=36:V=47:W=45:G=34:H=37:
GG=42:HH=45:SK=0
185 GOTO49
186 LINE(ST(58),SR(58))-(ST(56),
SR(56)),PSET:LINE-(ST(59),SR(59)
),PSET
187 M=59:N=53:P=61:Q=53:R=62:S=6
3:T=60:U=55:SK=1:G=50:H=57
188 GOTO49
189 M=75:N=77:P=67:Q=65:R=73:S=7
8:G=64:H=70:GG=72:HH=75:SK=3
190 GOTO49
191 LINE(ST(85),SR(85))-(ST(82),
SR(82)),PSET:LINE(ST(83),SR(83))
-(ST(92),SR(92)),PSET
192 M=94:N=92:P=93:Q=86:R=88:S=8
9:T=89:U=91:V=84:W=88:G=79:H=84:
GG=85:HH=89:SK=0
193 GOTO49
194 Q=107:R=108:S=104:T=104:U=10
9:G=95:H=105:SK=1
195 GOTO50
196 Q=115:R=116:S=112:T=112:U=11
7:V=117:W=118:G=111:H=113:SK=2
197 GOTO50
198 Q=131:R=121:S=124:G=128:H=13
0:GG=119:HH=126:SK=3
199 GOTO50
200 LINE(ST(139),SR(139))-(ST(13
2),SR(132)),PSET
201 T=146:U=142:V=138:W=136:G=13
9:H=145:GG=132:HH=137:SK=0
202 GOTO52
203 G=147:H=150
204 GOTO57
205 T=165:U=162:V=158:W=155:GG=1
59:HH=164:G=152:H=157:SK=0
206 GOTO52
```

THE COLORSOFT®
BUSINESS SYSTEM

QUALITY BUSINESS SOFTWARE FOR THE COLOR COMPUTER SINCE 1982

SAMPLE TRANSACTIONS INCLUDED

USER FRIENDLY AND MENU DRIVEN

SMALL BUSINESS ACCOUNTING This sales-based accounting package is designed for the non-accounting oriented businessman. It also contains the flexibility for the accounting oriented user to set up a double entry journal with an almost unlimited chart of accounts. Includes Sales Entry, transaction driven Accounts Receivable and Accounts Payable, Journal Entry, Payroll Disbursement, and Record Maintenance programs. System outputs include Balance Sheet, Income Statement, Customer and Vendor Status Reports, Accounts Receivable and Payable Aging Reports, Check Register, Sales Reports, Account Status Lists, and a Journal Posting List. $59.95

ACCOUNTS RECEIVABLE Includes detailed audit trails and history reports for each customer, prepares invoices and monthly statements, mailing labels, aging lists, and an alphabetized customer listing. The user can define net terms for commercial accounts or finance charges for revolving accounts. This package functions as a standalone A/R system or integrates with the Small Business Accounting package. $49.95

PAYROLL Designed for maintaining personnel and payroll data for up to 200 hourly and salaried employees with 8 deductions each. Calculates payroll and tax amounts, prints checks and maintains year-to-date totals which can be automatically transferred to the SBA package. Computes each pay period's totals for straight time, overtime and bonus pay and determines taxes to be withheld. Additional outputs include mailing list, listing of employees, year-to-date federal and/or state tax listing, and a listing of current misc. deductions. Suited for use in all states except Oklahoma and Delaware. $49.95

All programs require a printer and a minimum of 32K and 1 disk drive but will take advantage of 64K and 2 drives. Each package features a hi-res 51 x 24 black on green screen.

INCLUDE $5.00 Shipping/Handling Per Order.

BRANTEX, INC.
P. O. Box 1708
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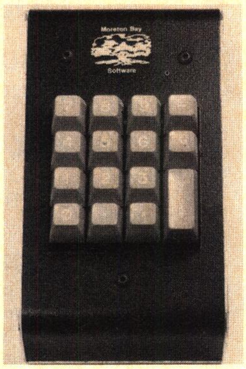
MORETON BAY

MORE KEYS



At last a quality numeric keypad for your Color Computer. This 15 key numeric pad plugs inside your computer and gives you the convenience of rapid numeric data entry. Dimensions: length 6½" (165mm), width 4" (101 mm), height 3" (76 mm). Baked black enamel finish. Specify computer model. MORE KEYS complete with cable and connector.

$69.95

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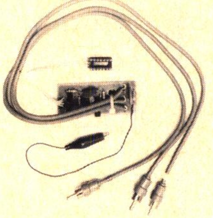
The BEST monitor driver available. Color composite, monochrome and audio output. For original CoCo D, E and F boards. $24.95.



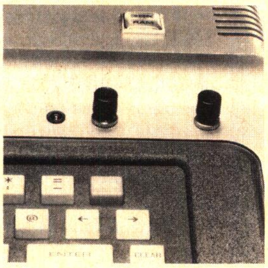
MONO II

Mono II for Color Computer 2. An excellent monochrome monitor driver that has audio output also. Specify model needed.

$24.95.

RESET-POWER-SWITCHES

A REAL IMPROVEMENT

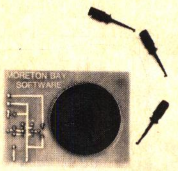


Move the power switch and reset switch where they belong. An LED power on light too! High quality parts, D and E boards and CoCo2 totally solderless kit. F board requires soldering.

Reset 1 Coco 1 $24.95
Reset 2 CoCo 2 $27.95

Either kit add $2.00 shipping and handling.

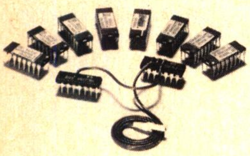
MINI MOUTH



Add sound to your mute monitor. Hear the bells and whistles of your software again. No batteries. Solderless installation.

All Color Computer Models
$24.95

64K UPGRADES



Instantly access 64K via M/L totally solderless kit to upgrade E Boards. Kit includes eight 4164 prime chips and chips U29 and U11 already soldered. SPECIAL: E Board Kit $39.95, F Board and Color Computer 2 $26.95.

Guaranteed Pretested

THE COCO-SWITCHER

A QUALITY PIECE OF HARDWARE

CO CO SWITCHER

The CoCo Switcher allows you to hook up three peripherals to your RS-232 jack. Connect your modem, printer and any other RS-232 compatible peripheral to the CoCo Switcher. An LED on the CoCo Switcher shows if your computer is on or off at a glance, The LED flickers when transmitting or receiving data.

Dimensions: 2½" (64mm) x 4" (102 mm) x 5 7/8 (150 mm)

$39.95 plus $2.00 shipping and handling

FILE CABINET

Data base, alphabetizes, sorts numeric entries, searches for key words or numbers, computes totals & averages by categories, saves records, changes or deletes them. Up to 20 entries for each record, up to 256 characters for each entry. Mailing list included. Output to screen, printer or tape. Print all or selected records, +, −, ×, ÷ Numeric entries.

16K EXB Cassette $29.95

COCOWRITER II

Powerful and full featured. An excellent word processor at an affordable price. 32, 51, 64 or 85 characters per line, justify right, left, center, insert delete, move blocks. Menu driven printing and formatting. Tabs, etc. One of the best values in word processing today!

16 K EXB Cassette $34.95, EXB Disk $44.95

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Version 3.2. The preferred business accounting package. A completely interactive system which features a general ledger you can customize for your own business. More than 900 accounts can be added. The accounts receivable routine will print invoices, record cash sales and automatically post to the general ledger. More than 400 customer balances can be maintained and automatically aged. Print customer statements and mailing labels. Profit and loss and balance statements printed at any time. Complete audit trails. Our most powerful business package. Buy the best!

32K Disk R/S DOS $99.95

MORE INVENTORY

Maintain an inventory of over 1000 units. Total inventory value computed with a single key stroke. Print lists of stock on hand, stock on order and stock to be ordered. Can also be used by hobbyists and collectors. Now you can organize your collection in a professional manner.

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SOFTWARE

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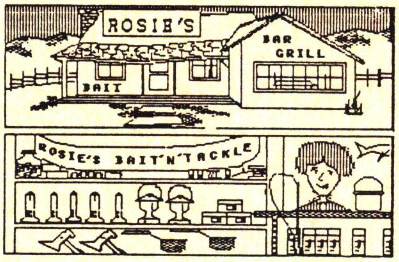
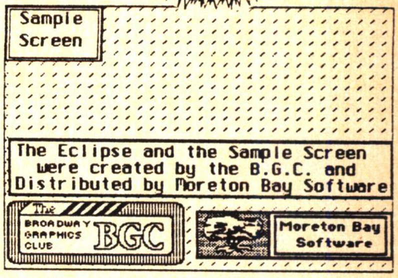
THE VERY BEST IN GRAPHICS



ECLIPSE

Allows you to "Zoom" in on the pixels of your graphics. Precision editing for your graphic creations. With ECLIPSE you can refine detailed graphics in high resolution pictures. Design game characters. Edit fonts. Easy to use. Bonus: extra graphic screens included Requires 32K, disk $19.95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The Eclipse and the Sample Screen were created by the B.G.C. and Distributed by Moreton Bay Software

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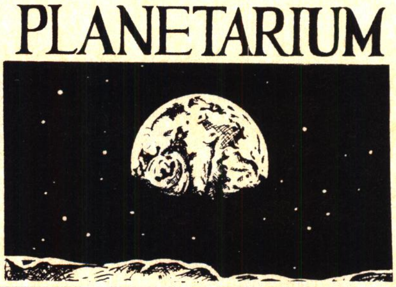

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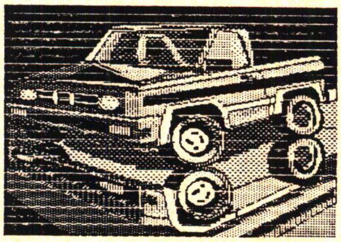

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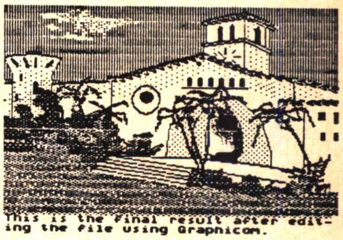
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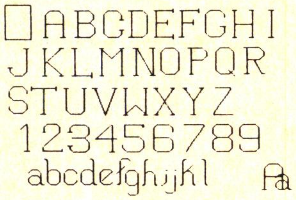

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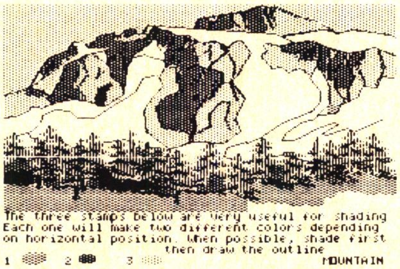
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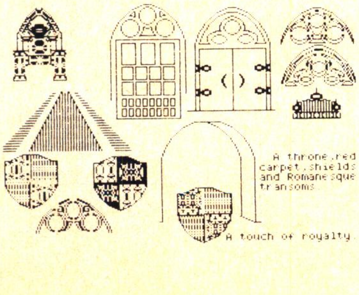
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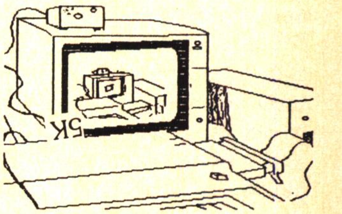

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Dynamic COMPUTER GRAPHICS

By Charles W. Dold

A fascinating aspect of computer graphics is the ability to present a three-dimensional figure on the screen and then cause it to rotate about the pitch (X), yaw (Y) and roll (Z) axis of the figure. Such a presentation is possible with a relatively modest home computer if one is willing to accept some reduction in the speed and smoothness of motion and complexity of the figure. To demonstrate the possibility, let us first derive an algorithm to describe the task and the overall "plan of attack."

Assume the body is located in a coordinate system formed by three lines 'X', 'Y' and 'Z' passing through a point zero (origin), each line perpendicular to the other two (Figure 1).

The 'X' axis is horizontal with the plus values to the right of the origin and the negative values to the left of the origin. The 'Y' axis is vertical with the plus values upward and the minus values downward from the origin. The 'Z' axis is at right angles to the other two and, in relation to the computer screen, would project directly forward for plus values and behind the screen for minus values. The body is placed in this coordinate system such that the center of gravity of the body is located at the origin of the system.

The initial location of the body is established in the coordinate system by assigning the 'X', 'Y' and 'Z' coordinates of each corner of the body. First, let us look at a two-dimensional plane figure for simplicity. Consider a square located in the X,Y plane with its center located at the origin of the X,Y axis. (Since the square is a symmetrical figure, the center of the figure is also its center of gravity.) The location of the corners of the square are (X_1Y_1), (X_2Y_2), (X_3Y_3) and (X_4Y_4).

Assuming that X_1Y_1 is the upper right corner, progressing clockwise the signs of the corner coordinates are (X_1Y_1), $(X_2{-}Y_2)$, $(-X_3{-}Y_3)$ and $(-X_4Y_4)$. Now if the square is rotated counter-clockwise about the origin through an angle of ϕ degrees, the new coordinates of the corners will be $(X'_1Y'_1)$, $(X'_2{-}Y'_2)$, $(-X'_3 {-}Y'_3)$ and $(-X'_4Y'_4)$. Using the equation of rotation (from our high school analytical geometry course) the new coordinates for each corner can be calculated from the initial coordinates as follows:

$$X' = X \cos \phi + Y \sin \phi$$
$$Y' = -X \sin \phi + Y \cos \phi$$

(It is necessary to observe the signs of the coordinates as we substitute them in the equations above.)

Now if we draw lines connecting the new corner coordinates, we will have drawn the square in its new position, rotated ϕ degrees from its initial position.

(Charles Dold is a registered professional engineer. He recently retired from Martin Marietta Orlando Aerospace where he was responsible for systems integration of military high speed data equipment which provided computer control for automatic testing and circuit routing. He has a bachelor's degree from Purdue University.)

So much for the two-dimensional (X,Y plane) figure. Now we will add the 'Z' axis. Take the plane containing the coordinates of the original square and slide it forward along the 'Z' axis to a point 'Z.' The new coordinates of the corners are $(X_1Y_1Z_1)$, $(X_2-Y_2Z_2)$, $(-X_3-Y_3Z_3)$ and $(-X_4Y_4Z_4)$. Slide the plane in the opposite direction from the origin along the 'Z' axis to a point -Z.

Starting with the upper right corner and numbering clockwise, the corners in this plane are numbers 5, 6, 7 and 8. The coordinates of the corners lying in the plane are $(X_5Y_5-Z_5)$, $(X_6-Y_6-Z_6)$, $(-X_7-Y_7-Z_7)$ and $(-X_8Y_8-Z_8)$. If we connect all eight corners we have drawn a cube (Figure 2).

Since the 'Z' coordinate of a corner is measured along the 'Z' axis to a line perpendicular to the 'Z' axis and passing through the corner, rotation of the corner about the 'Z' axis does not change the 'Z' coordinate of the corner. Therefore, the new coordinates of the corner after rotation about the 'Z' axis through the angle Φ degrees is:

$$X' = X \cos \Phi + Y \sin \Phi$$
$$Y' = -X \sin \Phi + Y \cos \Phi$$
$$Z' = Z$$

Rotation about the 'X' axis does not change the 'X' coordinates, therefore:

$$Z'' = Z' \cos \Theta + Y' \sin \Theta$$
$$Y'' = -Z' \sin \Theta + Y' \cos \Theta$$
$$X'' = X'$$

Rotation about the 'Y' axis does not change the 'Y' coordinates, therefore:

$$Z''' = Z'' \cos \Psi + X'' \sin \Psi$$
$$X''' = -Z'' \sin \Psi + X'' \cos \Psi$$
$$Y''' = Y''$$

New corner coordinates resulting from rotation about more than one axis are obtained, as shown, by solving the equations for rotation about each axis, in turn using the coordinates resulting from each previous set of calculations for substitution into the next following set of equations.

Figure 3 is a flow chart showing this sequence of operations in graphical form. Notice that after the three sets of equations of rotation have been solved, we are only interested in the

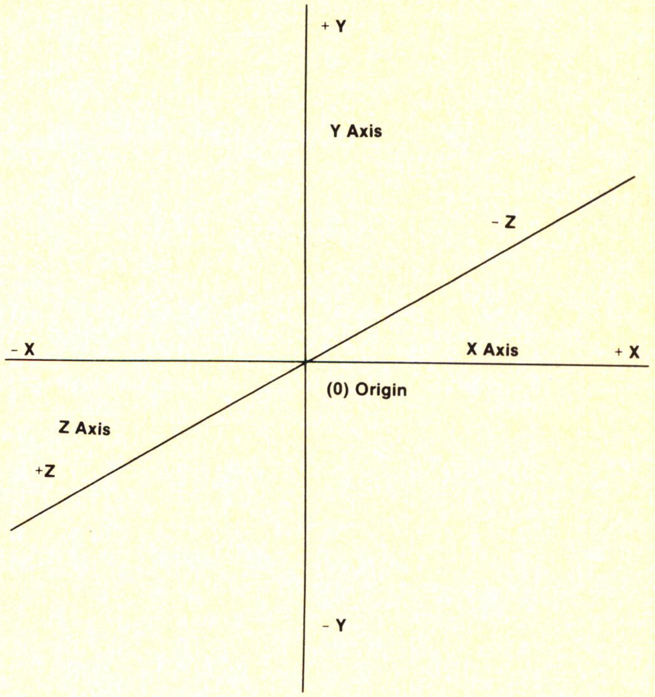


Figure 1
Coordinate System

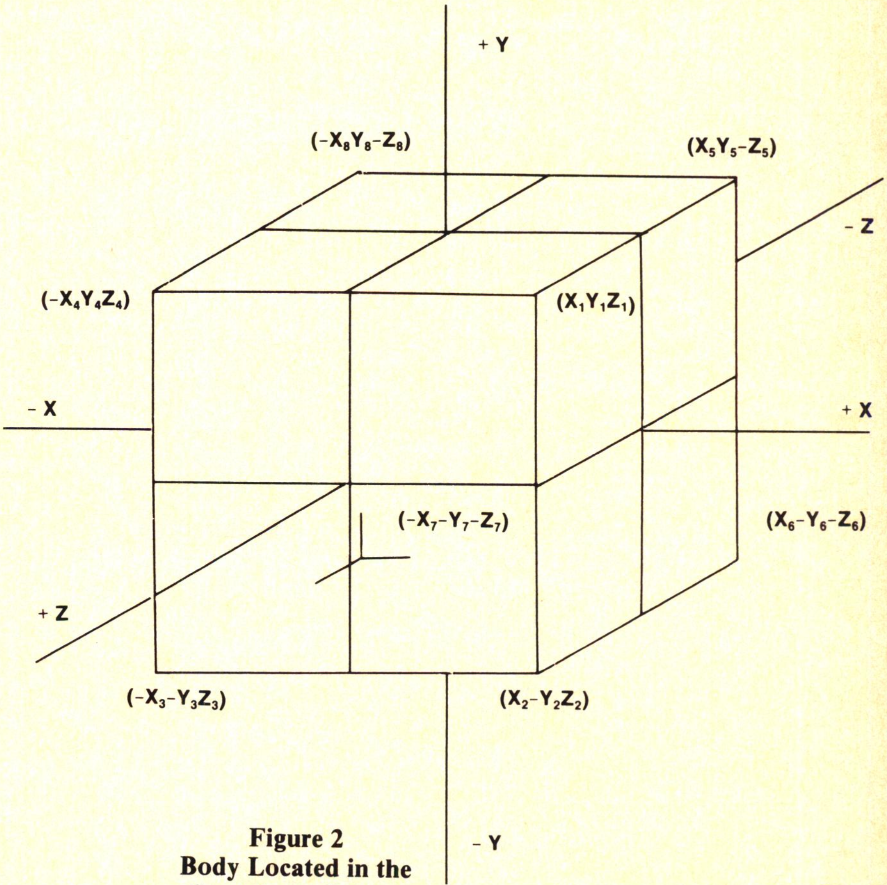
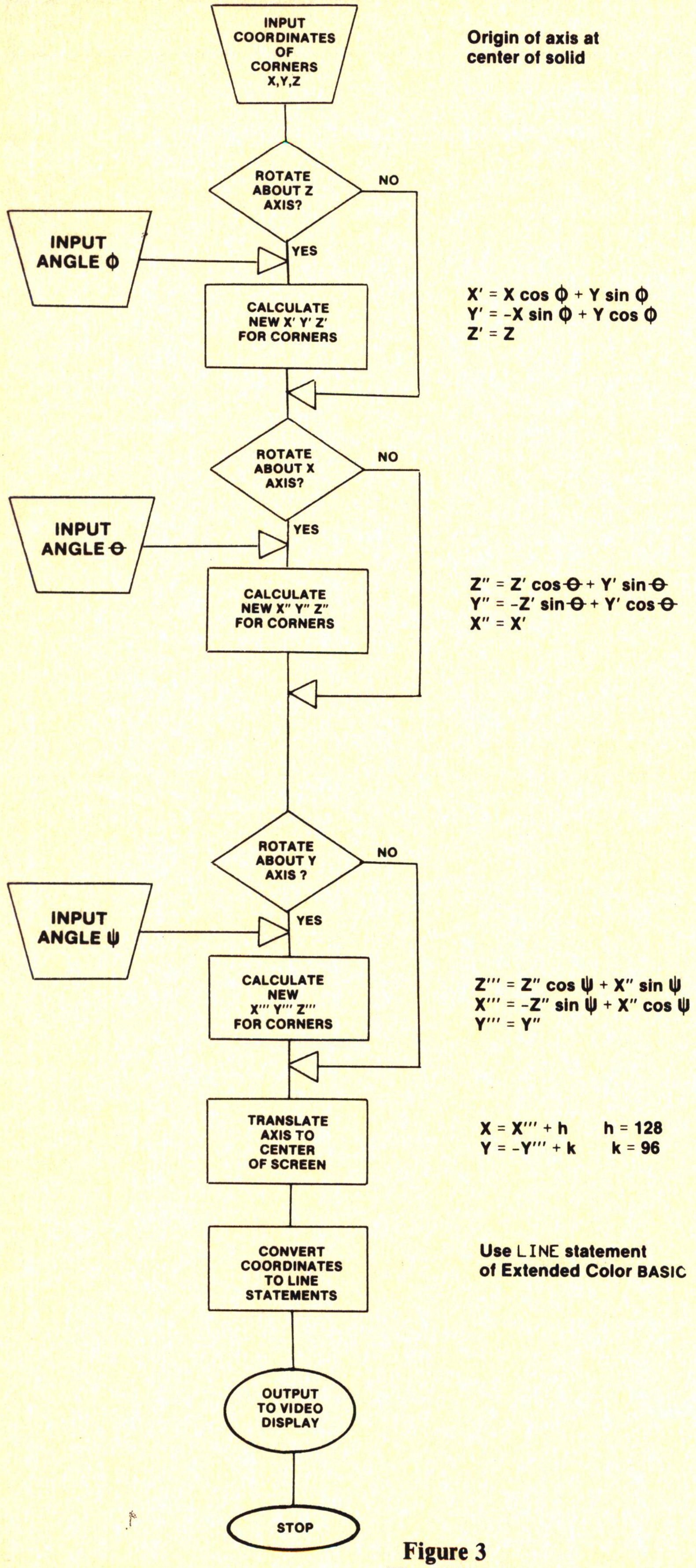


Figure 2
Body Located in the
Coordinate System


INPUT COORDINATES OF CORNERS X,Y,Z
ROTATE ABOUT Z AXIS?
NO
YES
INPUT ANGLE ϕ
CALCULATE NEW X' Y' Z' FOR CORNERS
ROTATE ABOUT X AXIS?
NO
YES
INPUT ANGLE θ
CALCULATE NEW X" Y" Z" FOR CORNERS
ROTATE ABOUT Y AXIS ?
NO
YES
INPUT ANGLE ψ
CALCULATE NEW X''' Y''' Z''' FOR CORNERS
TRANSLATE AXIS TO CENTER OF SCREEN
CONVERT COORDINATES TO LINE STATEMENTS
OUTPUT TO VIDEO DISPLAY
STOP

Origin of axis at center of solid

$X' = X \cos \phi + Y \sin \phi$
$Y' = -X \sin \phi + Y \cos \phi$
$Z' = Z$

$Z'' = Z' \cos \theta + Y' \sin \theta$
$Y'' = -Z' \sin \theta + Y' \cos \theta$
$X'' = X'$

$Z''' = Z'' \cos \psi + X'' \sin \psi$
$X''' = -Z'' \sin \psi + X'' \cos \psi$
$Y''' = Y''$

$X = X''' + h \quad h = 128$
$Y = -Y''' + k \quad k = 96$

Use `LINE` statement of Extended Color BASIC

Figure 3
Flow Chart

final 'X' and 'Y' coordinates of the corners. This is because the computer screen contains only the X,Y plane and we are plotting the projection of the X,Y coordinates onto this plane. The 'Z' coordinates were necessary in the calculations to find the final X,Y coordinates.

The initial coordinates of the corners of the cube were taken with the origin of the coordinate system at the center of gravity (in the case of the cube, also the geometric center). This was done to simplify the equations of rotation.

The origin of the screen map of the Tandy Color Computer is the upper left-hand corner of the screen. If we were to plot the coordinates without correction, the cube would be plotted with its center located at the upper left corner of the computer screen. It is necessary to move the center of the cube to the right and down to center it on the screen. This is done with equations of translation (analytical geometry again):

$X = X + h$
$Y = -Y + k$

In the case of the TRS-80C, h = 128 and k = 96 (for a 256-by-192 graphics screen).

The TRS-80C graphics screen locations in the 'Y' direction are inverted. That is, the numbers increase in positive values as they go down the screen. In order to prevent the figure from being plotted in the inverted position the second equation is written as shown to compensate for the inversion.

Now we are able to plot the object at any angular attitude we desire. The next step is to make it rotate about one or more axes. Referring to the flow chart (Figure 3), we see that we input a fixed angle of rotation ϕ about the 'Z' axis. Instead, we can input a variable angle 'S' which is made to vary between zero and 'M' degrees. To do this we use a `FOR/NEXT` loop, for example:

```
10 FOR S = 0 TO M STEP I
20 }
30 }  The equations of rotation
40 }  about the 'Z' axis
50 NEXT S
```

The `STEP I` is added so the angular increments can be chosen. If we repeat for all eight corners of the cube, we will have calculated the new coordinates of all corners of the cube after rotation about the 'Z' axis in increments of 'I' degrees.

In like manner, we can calculate the coordinates of the corners after rotation of 2I, 3I, 4I, etc., until S = M. By substituting the equations of rotation about the 'X' or 'Y' axis in the `FOR/NEXT` loop, we can calculate the coordinates of the corners of the cube after rotation, in increments, about the 'X' or 'Y' axis. By having the computer plot the lines connecting each set of coordinates for each set of calculations, the cube will appear to rotate about its center.

As I mentioned in the beginning, there are some limitations to the quality of the presentation. The greatest is speed, the rate at which a new plot can follow the last one. When we consider that there are 64 calculations and 12 `LINE` statements to plot the cube in a single position it is easy to see why it takes so long.

A faster method that can be used for simple shapes with few corners (such as the cube) is to store the results from each set of calculations in a different array. After all calculations are complete and the results stored in arrays, the data can be retrieved from each array in turn and the figure defined by these data plotted. This eliminates the time for calculations from the sequence of plotting. The drawback of this method is that a great amount of memory is required.

A third method which conserves memory for complex shapes (but is somewhat slower than the previous methods) is to output the results of each set of calculations to tape and then, after all calculations are complete for all increments of rotation and recorded on tape, recall the data from tape one set at a time and plot the figures one following the other.

Now we have a plan of attack; let's look at the three programs for accomplishing it. We have some necessary inputs and options which are common to all three programs. These are prompted by lines 30 through 110. (Note: The line numbers refer to Listing 1. The statements are the same in Listings 2 and 3, but may have slightly different locations in the program.)

First, we must tell the computer how far to rotate the figure and in what increments or steps. Next, we are asked if we want a stroboscopic presentation. This means do we want to clear the screen after each plot (Line 620) or do we want to preserve all of the plots to get an effect similar to a stroboscopic camera picture? Then we have a choice of whether we want rotation held at a fixed angle about any of the three axes and, if so, at what fixed angle.

If a fixed angle other than zero degrees is selected for rotation about a particular axis, the incremented angle 'R' is saved (lines 190, 310, 430) and the fixed angle is substituted (lines 200, 320, 440). After the calculations for the axis are completed the angle 'R' is restored (lines 280, 400, 520). If we don't want any rotation about a particular axis we can specify rotation at zero degrees for that axis. If a fixed angle of zero degrees is selected for rotation about an axis, the coordinates for that axis are unchanged, therefore, the calculations for that axis are skipped (lines 180, 300, 420).

Lines 150 and 160 contain the initial location of the corner coordinates of the cubic solid. After a set of calculations is completed the data is plotted on the screen in the *GRAPHIC1* program, stored in an array in the *GRAPHIC2* program or stored on cassette tape in the *GRAPHIC3* program and 'S' is incremented for the next set of calculations. This will continue until S = M, the limit of rotation.

In the *GRAPHIC1* program (Listing 1) the `FOR/NEXT` loop (lines 130-760) includes the PLOT routine (lines 590-760), therefore the object is plotted after each set of calculations.

In the *GRAPHIC2* program (Listing 2) the `FOR/NEXT` loop (lines 130-570) does not include the plot routine (lines 600-760). Instead, the results of each set of calculations are put in an array in which the variables are labeled X(S + A) and Y(S + A) (Line 550). Thus for each value of 'S' a new array is established.

After arrays are filled for all values of 'S' the data is read out, one array at a time, in the `FOR/NEXT` loop (lines 580-770) which includes the plot routine. An array is read and the data plotted for each array in turn.

The *GRAPHIC3* program (Listing 3) is similar to the *GRAPHIC2* program, except the results of each set of calculations are recorded on cassette tape instead of stored in an array. To accomplish this, the cassette recorder is prepared to record (lines 130-140) before the `FOR/NEXT` loop is executed.

After completing a set of calculations, the line of communication to the tape recorder is opened (Line 610) and the results of the calculations recorded on tape, after which the line of communication is closed (Line 650). Following this the angle is incremented to the next 'S,' the cycle repeated until S = M and the data for all positions of the object are recorded.

We are now prompted to rewind the recorder and prepare to play back (lines 670-680). A new `FOR/NEXT` loop is established (lines 690-950) which, for each angle 'Z,' will open the communication line (Line 710), play back the data (lines 720-750) and plot the figure defined by that data (lines 770-930). After plotting the figure the communication line will be closed (Line 940) and the loop incremented to the next 'Z.' This will continue until Z = M and all the data from the tape is read and plotted.

At this point we are ready to run the program. Let us answer the prompts with the following inputs:

Limit of rotation	360 degrees
Rotation increments	10 degrees
Strobe presentation	No
Fixed rotation about 'Z' axis	Yes
Angle	20 degrees
Fixed rotation about 'X' axis	Yes
Angle	30 degrees
Fixed rotation about 'Y' axis	No

This is all that is required for the *GRAPHIC1* and *GRAPHIC2* programs. For the *GRAPHIC3* program you will be asked to set up the recorder with a blank tape to record and later, you will be asked to rewind and press Play.

It is immediately evident that both *GRAPHIC1* and *GRAPHIC2* programs are much faster than the *GRAPHIC3* program. The approximate run times with the inputs specified are as shown in Table 1.

Table 1

Program	**Time (min:sec)**	
	Calculate	**Plot**
GRAPHIC1	2:15	
GRAPHIC2	2:00	:15
GRAPHIC3	6:15	4:00

GRAPHIC1 and *GRAPHIC2* require the same overall run time, however, since the plot routine is separated from the calculations in *GRAPHIC2*, the plot time is by far the shortest.

One reason that *GRAPHIC1* and *GRAPHIC2* run time is less than *GRAPHIC3* is because of the use of the statement `POKE 65495,0` to double the CPU rate. To demonstrate, try watching the flicker rate of the cursor as you `POKE 65495,0` and ENTER. To get back to normal `POKE 65494,0` and ENTER. You will notice that we return the CPU rate to normal at the end of the program.

If you should BREAK and not complete the program, it will be necessary to POKE the rate back to normal. This is especially important if you plan to CSAVE, CLOAD or input/output data to tape since these functions cannot be done at the high rate of the CPU. For this reason this scheme cannot be used in the *GRAPHIC3* program.

The programs can be modified to present other solids by substituting the coordinates of the corners of any solid for those of the cube as long as the conventions described at the beginning of this article are followed. If the number of corners is more or less than eight, it will be necessary to change all of the FOR/NEXT loops beginning with FOR A = 1 TO 8 to FOR A = 1 TO (X) where 'X' is the number of corners in the new solid.

(Charles Dold may be reached at 1701 N. Indian River Drive, New Smyrna Beach, FL 32069 for any questions concerning these programs. Please include a SASE.)

Listing 1: GRAPHIC1

```
140 ......181
410 .......34
590 ......201
END .....241
```

```
10 '"GRAPHIC1" BY C.DOLD 1985
20 CLS:POKE65495,0
30 INPUT"LIMIT OF ROTATION IN DE
GREES";M
40 INPUT"ROTATION INCREMENTS IN
DEGREES";I
50 INPUT"IS STROBE PRESENTATION
DESIRED (Y)ES-(N)O";N$
60 INPUT"FIXED ROTATION ABOUT TH
E Z AXIS(Y)ES-(N)O";B$
70 IF B$="Y" THEN INPUT"ANGLE IN
 DEGREES";B
80 INPUT"FIXED ROTATION ABOUT TH
E X AXIS(Y)ES-(N)O";C$
90 IF C$="Y" THEN INPUT"ANGLE IN
 DEGREES";C
100 INPUT"FIXED ROTATION ABOUT T
HE Y AXIS(Y)ES-(N)O";D$
110 IF D$="Y" THEN INPUT"ANGLE I
N DEGREES";D
120 DIMX(8):DIMY(8):DIMZ(8)
130 FOR S=0 TO M STEP I:R=S/57.2
9577951
140 'INITIAL COORDINATES FOR EAC
H CORNER OF THE SOLID
150 X(1)=50:Y(1)=50:Z(1)=50:X(2)
=50:Y(2)=-50:Z(2)=50:X(3)=-50:Y(
3)=-50:Z(3)=50:X(4)=-50:Y(4)=50:
Z(4)=50
160 X(5)=50:Y(5)=50:Z(5)=-50:X(6
)=50:Y(6)=-50:Z(6)=-50:X(7)=-50:
Y(7)=-50:Z(7)=-50:X(8)=-50:Y(8)=
50:Z(8)=-50
170 IF B$="N" THEN 210
180 IF B=0 THEN 290
190 E=R
200 IF B>0 THEN R=B/57.2957791
210 FOR A=1 TO 8
220 'CALCULATE NEW COORDINATES I
N THE X,Y PLANE
230 X=X(A)*COS(R)+Y(A)*SIN(R)
240 Y=-X(A)*SIN(R)+Y(A)*COS(R)
250 X(A)=X:Y(A)=Y
260 NEXT A
270 IF B$="N" THEN 290
280 R=E
290 IF C$="N" THEN 330
300 IF C=0 THEN 410
310 E=R
320 IF C>0 THEN R=C/57.29577951
330 FOR A=1 TO 8
340 'CALCULATE NEW COORDINATES I
N THE Z,Y PLANE
350 Z=Z(A)*COS(R)+Y(A)*SIN(R)
360 Y=-Z(A)*SIN(R)+Y(A)*COS(R)
370 Y(A)=Y:Z(A)=Z
380 NEXT A
390 IF C$="N" THEN 410
400 R=E
410 IF D$="N" THEN 450
420 IF D=0 THEN 530
430 E=R
440 IF D>0 THEN R=D/57.29577951
450 FOR A=1 TO 8
460 'CALCULATE NEW COORDINATES I
N THE Z,X PLANE
470 Z=Z(A)*COS(R)+X(A)*SIN(R)
480 X=-Z(A)*SIN(R)+X(A)*COS(R)
490 Z(A)=Z:X(A)=X
500 NEXT A
510 IF D$="N" THEN 530
520 R=E
530 FOR A=1 TO 8
540 'TRANSLATION OF AXIS TO CENT
ER OF SCREEN
550 X(A)=X(A)+128
560 Y(A)=96-Y(A)
570 NEXT A
580 'PLOT ROUTINE
590 PMODE 4,1
600 IF R=0 THEN 620 ELSE 610
610 IF N$="Y" THEN 630
620 PCLS
630 SCREEN 1,0
```

```
640 LINE (X(1),Y(1))-(X(2),Y(2))
,PSET
650 LINE -(X(3),Y(3)),PSET
660 LINE -(X(4),Y(4)),PSET
670 LINE -(X(1),Y(1)),PSET
680 LINE -(X(5),Y(5)),PSET
690 LINE -(X(6),Y(6)),PSET
700 LINE -(X(7),Y(7)),PSET
710 LINE -(X(8),Y(8)),PSET
720 LINE -(X(5),Y(5)),PSET
730 LINE (X(6),Y(6))-(X(2),Y(2))
,PSET
740 LINE (X(3),Y(3))-(X(7),Y(7))
,PSET
750 LINE (X(4),Y(4))-(X(8),Y(8))
,PSET
760 NEXT S
770 POKE 65494,0
780 GOTO 780
```

140	42
390	47
580	252
END	251

Listing 2: GRAPHIC2

```
10 '"GRAPHIC2" BY C.DOLD 1985
20 CLS:POKE 65495,0
30 INPUT"LIMIT OF ROTATION IN DE
GREES";M
40 INPUT"ROTATION INCREMENTS IN
DEGREES";I
50 INPUT"IS STROBE PRESENTATION
DESIRED (Y)ES-(N)O";N$
60 INPUT"FIXED ROTATION ABOUT TH
E Z AXIS(Y)ES-(N)O";B$
70 IF B$="Y" THEN INPUT"ANGLE IN
 DEGREES";B
80 INPUT"FIXED ROTATION ABOUT TH
E X AXIS(Y)ES-(N)O";C$
90 IF C$="Y" THEN INPUT"ANGLE IN
 DEGREES";C
100 INPUT"FIXED ROTATION ABOUT T
HE Y AXIS(Y)ES-(N)O";D$
110 IF D$="Y" THEN INPUT"ANGLE I
N DEGREES";D
120 DIM X(400):DIM Y(400):DIM Z(
400)
130 FOR S=0 TO M STEP I:R=S/57.2
9577951
140 'INITIAL COORDINATES FOR EAC
H CORNER OF THE SOLID
150 X(1)=50:Y(1)=50:Z(1)=50:X(2)
=50:Y(2)=-50:Z(2)=50:X(3)=-50:Y(
3)=-50:Z(3)=50:X(4)=-50:Y(4)=50:
```

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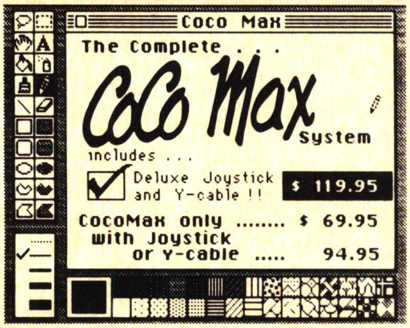

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SHIPPING will be charged at our ACTUAL COST
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```
Z(4)=50
160 X(5)=50:Y(5)=50:Z(5)=-50:X(6
)=50:Y(6)=-50:Z(6)=-50:X(7)=-50:
Y(7)=-50:Z(7)=-50:X(8)=-50:Y(8)=
50:Z(8)=-50
170 IF B$="N" THEN 210
180 IF B=0 THEN 290
190 E=R
200 IF B>0 THEN R=B/57.2957791
210 FOR A=1 TO 8
220 'CALCULATE NEW COORDINATES I
N THE X,Y PLANE
230 X=X(A)*COS(R)+Y(A)*SIN(R)
240 Y=-X(A)*SIN(R)+Y(A)*COS(R)
250 X(A)=X:Y(A)=Y
260 NEXT A
270 IF B$="N" THEN 290
280 R=E
290 IF C$="N" THEN 330
300 IF C=0 THEN 410
310 E=R
320 IF C>0 THEN R=C/57.29577951
330 FOR A=1 TO 8
340 'CALCULATE NEW COORDINATES I
N THE Z,Y PLANE
350 Z=Z(A)*COS(R)+Y(A)*SIN(R)
360 Y=-Z(A)*SIN(R)+Y(A)*COS(R)
370 Y(A)=Y:Z(A)=Z
380 NEXT A
390 IF C$="N" THEN 410
400 R=E
410 IF D$="N" THEN 450
420 IF D=0 THEN 530
430 E=R
440 IF D>0 THEN R=D/57.29577951
450 FOR A=1 TO 8
460 'CALCULATE NEW COORDINATES I
N THE Z,X PLANE
470 Z=Z(A)*COS(R)+X(A)*SIN(R)
480 X=-Z(A)*SIN(R)+X(A)*COS(R)
490 Z(A)=Z:X(A)=X
500 NEXT A
510 IF D$="N" THEN 530
520 R=E
530 FOR A=1 TO 8
540 'TRANSLATION OF AXIS TO CENT
ER OF SCREEN. PUT IN ARRAYS
550 X(A)=X(A)+128:Y(A)=96-Y(A):X
(S+A)=X(A):Y(S+A)=Y(A)
560 NEXT A
570 NEXT S
580 FOR Z=0 TO M STEP I
590 'PLOT ROUTINE
600 PMODE 4,1
610 IF Z=0 THEN 630 ELSE 620
620 IF N$="Y" THEN 640
630 PCLS
640 SCREEN 1,0
650 LINE (X(1+Z),Y(1+Z))-(X(2+Z)
,Y(2+Z)),PSET
660 LINE -(X(3+Z),Y(3+Z)),PSET
670 LINE -(X(4+Z),Y(4+Z)),PSET
680 LINE -(X(1+Z),Y(1+Z)),PSET
690 LINE -(X(5+Z),Y(5+Z)),PSET
700 LINE -(X(6+Z),Y(6+Z)),PSET
710 LINE -(X(7+Z),Y(7+Z)),PSET
720 LINE -(X(8+Z),Y(8+Z)),PSET
730 LINE -(X(5+Z),Y(5+Z)),PSET
740 LINE (X(6+Z),Y(6+Z))-(X(2+Z)
,Y(2+Z)),PSET
750 LINE (X(3+Z),Y(3+Z))-(X(7+Z)
,Y(7+Z)),PSET
760 LINE (X(4+Z),Y(4+Z))-(X(8+Z)
,Y(8+Z)),PSET
770 NEXT Z
780 POKE 65494,0
790 GOTO 790
```

150	114
390	212
650	149
END	127

One-Liner Contest Winner . . .

This one-liner plays a song familiar to all Led Zeppelin fans, "Stairway To Heaven."

The listing:

```
1 PLAY"V31T4O4L3CEABECBO5CO4ECO5
CO4F#DO3AO4FECO3AO4L3CL3ECO3AGAL
2A"
```

Dave Milsom
Newark, DE

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape*.)

Listing 3: GRAPHIC3

```
10 '"GRAPHIC3" BY C.DOLD 1985
20 CLS
30 INPUT"LIMIT OF ROTATION IN DE
GREES";M
40 INPUT"ROTATION INCREMENTS IN
DEGREES";I
50 INPUT"IS STROBE PRESENTATION
DESIRED (Y)ES-(N)O";N$
60 INPUT"FIXED ROTATION ABOUT TH
E Z AXIS(Y)ES-(N)O";B$
70 IF B$="Y" THEN INPUT"ANGLE IN
 DEGREES";B
```

```
80 INPUT"FIXED ROTATION ABOUT TH
E X AXIS(Y)ES-(N)O";C$
90 IF C$="Y" THEN INPUT"ANGLE IN
 DEGREES";C
100 INPUT"FIXED ROTATION ABOUT T
HE Y AXIS(Y)ES-(N)O";D$
110 IF D$="Y" THEN INPUT"ANGLE I
N DEGREES";D
120 DIMX(8):DIMY(8):DIMZ(8)
130 CLS:PRINT"POSITION TAPE-PRES
S PLAY AND RECORD"
140 INPUT"PRESS<ENTER>WHEN READY
";R$
150 FOR S=0 TO M STEP I:R=S/57.2
9577951
160 'INITIAL COORDINATES FOR EAC
H CORNER OF THE SOLID
170 X(1)=50:Y(1)=50:Z(1)=50:X(2)
=50:Y(2)=-50:Z(2)=50:X(3)=-50:Y(
3)=-50:Z(3)=50:X(4)=-50:Y(4)=50:
Z(4)=50
180 X(5)=50:Y(5)=50:Z(5)=-50:X(6
)=50:Y(6)=-50:Z(6)=-50:X(7)=-50:
Y(7)=-50:Z(7)=-50:X(8)=-50:Y(8)=
50:Z(8)=-50
190 IF B$="N" THEN 230
200 IF B=0 THEN 310
210 E=R
220 IF B>0 THEN R=B/57.2957791
230 FOR A=1 TO 8
240 'CALCULATE NEW COORDINATES I
N THE X,Y PLANE
250 X=X(A)*COS(R)+Y(A)*SIN(R)
260 Y=-X(A)*SIN(R)+Y(A)*COS(R)
270 X(A)=X:Y(A)=Y
280 NEXT A
290 IF B$="N" THEN 310
300 R=E
310 IF C$="N" THEN 350
320 IF C=0 THEN 430
330 E=R
340 IF C>0 THEN R=C/57.29577951
350 FOR A=1 TO 8
360 'CALCULATE NEW COORDINATES I
N THE Z,Y PLANE
370 Z=Z(A)*COS(R)+Y(A)*SIN(R)
380 Y=-Z(A)*SIN(R)+Y(A)*COS(R)
390 Y(A)=Y:Z(A)=Z
400 NEXT A
410 IF C$="N" THEN 430
420 R=E
430 IF D$="N" THEN 470
440 IF D=0 THEN 550
450 E=R
460 IF D>0 THEN R=D/57.29577951
470 FOR A=1 TO 8
480 'CALCULATE NEW COORDINATES I
N THE Z,X PLANE
490 Z=Z(A)*COS(R)+X(A)*SIN(R)
500 X=-Z(A)*SIN(R)+X(A)*COS(R)
510 Z(A)=Z:X(A)=X
520 NEXT A
530 IF D$="N" THEN 550
540 R=E
550 FOR A=1 TO 8
560 'TRANSLATION OF AXIS TO CENT
ER OF THE SCREEN
570 X(A)=X(A)+128
580 Y(A)=96-Y(A)
590 NEXT A
600 'STORE NEW COORDINATES ON TA
PE
610 OPEN"O",#-1,"ARRAY"
620 FOR A= 1TO 8
630 PRINT#-1,X(A),Y(A)
640 NEXT A
650 CLOSE#-1
660 NEXT S
670 PRINT"REWIND THE RECORDER AN
D PRESS PLAY"
680 INPUT"PRESS<ENTER>WHEN READY
";R$
690 FOR Z=0 TO M STEP I
700 'RECALL NEW COORDINATES FROM
 TAPE
710 OPEN"I",#-1,"ARRAY"
720 FOR A= 1 TO 8
730 IF EOF(-1) THEN 770
740 INPUT #-1,X(A),Y(A)
750 NEXT A
760 'PLOT ROUTINE
770 PMODE 4,1
780 IF Z=0 THEN 800 ELSE 790
790 IF N$="Y" THEN 810
800 PCLS
810 SCREEN 1,0
820 LINE (X(1),Y(1))-(X(2),Y(2))
,PSET
830 LINE -(X(3),Y(3)),PSET
840 LINE -(X(4),Y(4)),PSET
850 LINE -(X(1),Y(1)),PSET
860 LINE -(X(5),Y(5)),PSET
870 LINE -(X(6),Y(6)),PSET
880 LINE -(X(7),Y(7)),PSET
890 LINE -(X(8),Y(8)),PSET
900 LINE -(X(5),Y(5)),PSET
910 LINE (X(6),Y(6))-(X(2),Y(2))
,PSET
920 LINE (X(3),Y(3))-(X(7),Y(7))
,PSET
930 LINE (X(4),Y(4))-(X(8),Y(8))
,PSET
940 CLOSE#-1
950 NEXT Z
960 GOTO 960
```

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- Radio Shack or NEW TYPE J & M Disc Controller Offering Switch Selectable Roms and Parallel Printer Port
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- Full 90 Day Warranty

Single Drive (SSDD) in Dual Cabinet w/Controller	**$299.95**
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Additional Drive	**129.95**
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Dual Cabinet/Power Supply	**79.95**
Disc Controller (Radio Shack or J & M)	**139.95**
Connecting Cable	**24.95**
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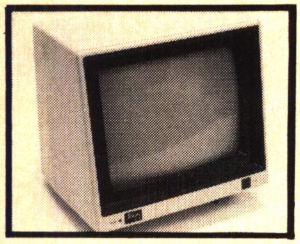
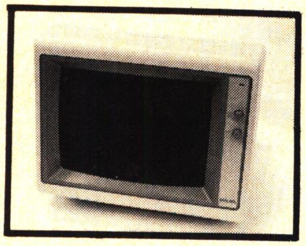
QUALITY VIDEO MONITORS



SAKATA COLOR SC-100 $239.95

The SC-100 is a streamlined 13" composite monitor which produces sharp, brilliant colors. The cabinet is made of durable styrene and is available in an attractive off-white color. Includes audio with speaker and earphone jack. We highly recommend this color monitor because of its excellent performance and beautiful styling.



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A 12" amber screen composite monitor of the highest quality with exceptional reliability and performance. 18 MHZ bandwidth. Attractive off-white cabinet. We use this monitor in our offices.

We carry other brands also.

Call for additional information.

Order a quality monitor from us and get a Universal Video Driver for only $24.95

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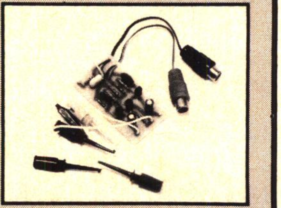

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300 to 9600 baud. Complete with all cables and power supply.

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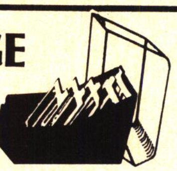

Attractive, heavy duty, smoked acrylic case. Holds and protects up to 75 5¼" discs with six moveable, indexed dividers.

SUPER BARGAIN — ONLY $9.95

SPECIAL—Purchase this storage case including 10 discs for only $21.95

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64K Memory Expansion Kit

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The Mark Data Products Accounting System is ideal for the small businessman needing a fast, efficient means to process income and expenses, prepare detailed reports and maintain most of the information required at tax time. The system is a family of programs which operate by means of a "menu" selection scheme. When the operator selects a task to perform, the computer loads a program designed to handle that task from the system disc. The system disc contains all of the programs required to create, update and maintain data files and prepare the necessary accounting reports including a transaction journal, a P & L or income report, an interim or trial balance and a balance sheet.

This accounting software equals or exceeds higher priced packages for other computers and includes a detailed operating manual. **ONLY $99.95**

ORDER ENTRY SYSTEM

The Mark Data Product sales order processing system provides a fast, efficient means to enter orders, print shipping papers and invoices, prepare sales reports, and monitor receivables. The system automatically enhances the monitor screen to a 51 character by 24 line display. 32K of memory is required along with an 80-column printer and one or more disc drives.

This order entry software equals or exceeds higher priced packages for other computers and includes a detailed operating manual. **ONLY $99.95**

EASY EDIT

Easy-Edit is a versatile, easy to use text editor which is particularly convenient for assembly language and BASIC programming. This editor offers powerful text handling capabilities along with many special features including a built-in disc operating system, 32/64K memory sense, a 51 character by 24 line screen, auto key repeat, extensive error reporting, and complete compatibility with popular assemblers. Requires 32K and at least one disc drive. Master disc and instructions are packaged in an attractive 3-ring binder. **$34.95**

EASY-FILE Data Management System

Rainbow, Nov. '84 *"Easy File is one program that lives up to its name. . . Easy File is so easy it speaks for itself."*

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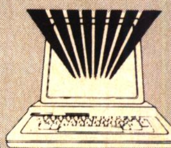
Need a good mailing list or customer list program? How about a program to keep track of your investments, your computer magazines, or record collection? Do you have an inventory of all household items for insurance purposes? **EASY-FILE** will do all of these things and many more. The **EASY-FILE** master disc and instructions are packaged in an attractive 3-ring binder. Requires 32K and at least one disc drive.

Order Yours Now! Get Organized for Only $59.95!

SUPER SCREEN

The Color Computer Supercharger



- A big 52 character by 24 line screen
- 'PRINT @' is fully implemented on the big screen
- Easily combine text with hi-res graphics
- Auto-key repeat for greater keyboard convenience
- The 'ON ERROR GOTO' statement is fully implemented
- Control codes for additional function

Guaranteed to be the most frequently used program in your software library. . . once you use it you won't be without it! **Cassette $29.95 Disc $32.95**

JUST FOR FUN

Adventures Now Available for IBM & Tandy 1000/1200

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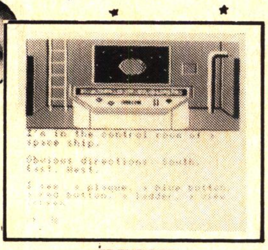


```
I'm in the control room of a
space ship.

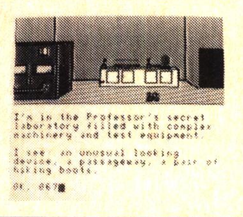
Obvious directions: South,
East, West.

I see: a plaque, a blue button,
a red button, a ladder, a view
screen.

OK, 8
```

TREKBOER

This exciting hi-res **adventure** begins aboard the starship Trekboer in the 21st century. Life on Earth is threatened by a deadly virus and your mission is to search the frontiers of space and return with a cure to save mankind from disaster.



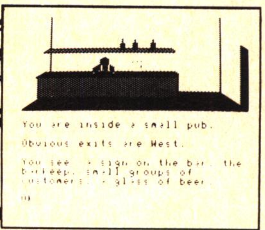
```
I'm in the Professor's secret
laboratory filled with complex
machinery and test equipment.

I see: an unusual looking
device, a passageway, a pair of
hiking boots.

OK, 667█
```

CALIXTO ISLAND

A valuable museum treasure has been stolen; can you recover it??? This is a challenging **adventure** with an occasional twist of humor. You'll visit a secret laboratory, a Mayan pyramid, and you'll meet crazy Trader Jack—all in living color and exciting detail.



```
You are inside a small pub.

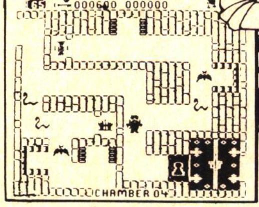
Obvious exits are West.

You see: a sign on the bar, the
barkeep, small groups of
customers, a glass of beer.

OK
```

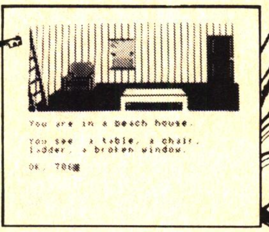
SHENANIGANS

Countless legends tell of a magnificent pot of gold hidden at the end of the rainbow. Many have attempted to find the marvelous treasure but success has eluded them and it remains hidden to this day. You, as a dedicated **adventurer**, have determined to search for the fabled riches.



TUT'S TOMB

Explore the ancient, mystical tomb of the great Pharoah. Find the magical keys which lead you to unbelievable treasures as you outmaneuver the creatures that slither and swarm about you. Super fast **arcade** action—this one will knock your socks off.



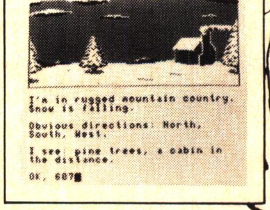
```
You are in a beach house.

You see: a table, a chair,
ladder, a broken window.

OK, 786█
```

SEA SEARCH

Get your shark repellant and scuba tanks ready! The graphics in this **adventure** are truly outstanding and the underwater scenes are unforgettable. You'll run into a pirate, a mermaid and some hungry sharks in this coloful and unique treasure hunt.



```
I'm in rugged mountain country.
Snow is falling.

Obvious directions: North,
South, West.

I see: pine trees, a cabin in
the distance.

OK, 687█
```

BLACK SANCTUM

Encounter the forces of black magic as you roam around an 18th century monastery. You'll see all the evil locations in this spooky **adventure**; you'll love searching for and destroying evil in this classic tale. A MUST for every adventure game fan!

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By Keith Osani

Vocabulary is a study program suitable for all ages. It will work on a 16K or 32K computer. (If you have 16K, you must type in `PCLEAR 1` before loading.) Up to 50 words may be programmed, then you can be tested on your words.

You have the option of having the computer give the words or the definitions. If you are incorrect, the computer will either ask again or go on, as you wish. After testing, the computer will give your score. You may also review your definitions by quizzing the computer.

The words may be saved on your disk for future study or to be added to later with the update function.

You may also print out your vocabulary words with the DMP-200 printer or other comparable printers. The printer control codes are shown as follows:

Printer Control Codes for the DMP-200

Line Number	Code
1510	Selects data processing mode
1520	Starts elongation
1610	End elongation
1620	Carriage return

(Keith Osani is a ninth grader at Burr's Lane Junior High School. He is a self-taught computer programmer.)

DIGISECTOR™ DS-69 VIDEO DIGITIZER FOR THE COCO

Give your COCO the gift of sight!
The Micro Works is happy to introduce the newest member of our Digisector™ family — the DS-69 Video Digitizer for your COCO. It has all the standard features of its big brothers but comes with a price tag that's right for you.

- **High Resolution** 256 by 256 spatial resolution.
- **Precision** 64 levels of grey scale.
- **SPEED!** ½ second for a full screen of video.
- **Compactness** Self contained in a plug in Rompack.
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The DS-69 Digisector opens up a whole new world for you and your COCO. Your computer can be a security system, take portraits, analyze signatures, inspect assembly work . . . the DS-69 is your COCO's eyes. Use the DS-69 and a TV camera to get fast, precise conversion of video signals into digital data.

Powerful C-SEE™ software.
C-See is a menu-driven software package included with your DS-69. It provides high speed 5 level digitizing to the screen, high precision 16 level digitizing for superb hard copy printout, and simple software control of brightness and contrast. Or call our driver routines from your own Basic program for easy 64 level random access digitizing. Pictures taken by the DS-69 may be saved on disk by C-See and then edited by our optional MAGIGRAPH package for enhancements and special effects.

John Hancock

The DS-69 comes with a one year warranty. C-See supports both cassette and disk operation with the Multi-Pak adaptor and requires 64K. Cameras and other accessories are available from The Micro Works. Let your COCO see the World!

■ DS-69 Digisector & C-See Software	$149.95
■ MAGIGRAPH Graphics Package on disk	$ 39.95

Terms: Visa, Mastercard, Check or C.O.D.

Purveyors of Fine Video Digitizers Since 1977.

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180	218	1250	190
370	241	1430	244
580	246	1610	38
800	38	END	81
1050	16		

The listing: VOCABLRY

```
10 '***VOCABULARY***
20 '*BY KEITH OSANI*
30 '***2/13/85******
40 FOR Q=1TO10:R=RND(8):CLS R:NE
XT Q
50 PLAY"T15O1ED"
60 CLEAR4000
70 CLS:T=0:QQ=0
80 PRINT@10,"VOCABULARY":PRINT@4
0,"BY KEITH OSANI"
90 PRINT@106,"1) ADD WORDS
              2) GET TESTED
              3) DICTIONARY
              4) SAVE WORDS
              5) LOAD WORDS
              6) UPDATE FILE
              7) PRINT FILE"
100 PRINT@362,"WHICH ";:INPUT"ON
E";A
110 SOUND 100,3
120 IF A<1 OR A>7 THEN PRINT@394
,"(1-7)":FOR R=1TO1000:NEXT R:GO
TO70
130 ON A GOSUB 150,300,630,760,8
80,1040,1480
140 GOTO60
150 CLEAR:DIM A$(50):DIM B$(50)
160 F=1
170 FOR X= F TO 100
180 CLS
190 PRINT@11,"add words"
200 PRINT"TYPE <XX> WHEN YOU ARE
 DONE"
210 IF X=51 THEN CLS:PRINT@230,"
I AM FULL":FOR B=1TO1000:NEXT B:
D=X-1:IF P$="UPDATE"THEN760 ELSE
 70
220 PRINT"VOCABULARY WORD #"X
230 PRINT@192,"TYPE IN ";:LINE I
NPUT"WORD:";A$(X)
240 IF A$(X)="XX" THEN 270
250 PRINT@256,"TYPE IN ";:LINE I
NPUT"MEANING:";B$(X)
260 NEXT X
270 D=X-1:IF P$="UPDATE"THEN OO=
D:GOTO760
280 OO=D
290 GOTO70
300 OO=D:P=0:CLS:PRINT@8,"vocabu
lary test":GOSUB1210
310 F=0:L=1
320 FOR X=1TO D:CLS
330 CLS:PRINT@8,"vocabulary test
"
340 PRINT"TYPE <XX> TO STOP TEST
ING"
350 PRINT@128,"";:PRINTA$(X);:LI
NE INPUT"=";S$
360 IF S$="XX"THEN QQ=3:X=X-1:GO
TO530
370 IF S$=B$(X) THEN 480
380 IF M=1 THEN P=P+1:GOTO330
390 FOR W=1TO1000:NEXT W
400 CLS3:PRINT@106,"WRONG!!!!!";
410 PRINT@197,"THE CORRECT ANSWE
R IS"
420 PRINT@230,B$(X)"!!!!"
430 SCREEN0,1
440 PLAY"O1T10L3ET5L1D"
450 FOR T=1TO2000:NEXT T
460 IF X=D THEN 530
470 NEXT X
480 FOR W=1TO1000:NEXT W:CLS5:PR
INT@233,"CORRECT!!!";
490 SCREEN0,1
500 F=F+1
510 FOR Y=1TO10:POKE 65344,1:K=R
ND(255):L=RND(5):SOUND K,L:POKE
65344,2:Z=RND(8):CLS Z:PRINT@233
,"CORRECT!!!!!!!!!";:NEXT Y
520 NEXT X
530 CLS5:PRINT@5,"vocabulary tes
t ended";
540 SCREEN0,1
550 IF QQ=3 THEN RR=D:D=X
560 D=P+D
570 PRINT@97,"YOU GOT "F" OUT OF
 "D:PRINT@129,"CORRECT!";
580 FOR Y=1TO2000:NEXT Y
590 D=D-P
600 D=RR
610 IF QQ=3 THEN D=D-1
620 GOTO70
630 CLS:PRINT@8,"dictionary mode
"
640 D=OO
650 PRINT"TO STOP TYPE <XX>"
660 PRINT@224,"WHAT WOULD YOU LI
KE ":LINE INPUT"TO KNOW?";S$
670 IF S$="XX"THEN 70
680 FOR X=1TO D
690 IF S$=A$(X) THEN 730
700 IF S$=B$(X) THEN PRINT@352,S
$;:PRINT"="A$(X):GOTO740
710 NEXT X
720 PRINT@352,"I DON'T KNOW THAT
":GOTO740
730 PRINT@352,S$;:PRINT"="B$(X)
740 A$=INKEY$:IF A$=""THEN 740
```

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CBASIC is a fully integrated, easy to use Basic program Editor and Compiler package. CBASIC is 99% syntax compatible with Disk Extended Color Basic programs, so most Basic programs can be loaded and compiled by CBASIC with little or no changes required. The compiler is an optomizing two-pass integer Basic compiler that can convert programs written in Disk Extended Color Basic into 100% pure 6809 Machine Language programs which are written directly to disk in a LOADM compatible format.

The programs generated by the compiler can be run as complete stand alone programs. A built-in linker/editor will automatically select one and only one copy of each subroutine that is required from the internal run-time library and insert them directly in the program. This eliminates the need for cumbersome, often wasteful separate "run-time" packages.

CBASIC WAS DESIGNED FOR BOTH BEGINNING & ADVANCED USERS

CBASIC is a Powerful tool for the Beginner or Novice programmer as well as the Advanced Basic or Machine Language programmer. The Beginner or Novice programmer can write and compile programs without having to worry about Stack Pointers, DP registers, memory allocation, and so on, because CBASIC will handle it for you automatically. All they have to do is write their programs using the standard Basic statements and syntax. For the advanced Basic and Machine Language programmers, CBASIC will let you take command and control every aspect of your program, even generating machine code directly in a program for specialized routines or functions.

CBASIC adds many features not found in Color Basic, like Interrupt, Reset, and On Error handling. It also has advanced programming features that allow machine level control of the Stack and Direct Page registers, variable allocation, automatic 64K RAM control, program origin and even multiple origins. It can even have machine language code generated within a program that executes just like any other Basic program line.

FULL COMMAND SUPPORT & SPEED

CBASIC features well over 100 Basic Commands and Functions that fully support Disk, Tape, Printer and Screen I/O. It also supports ALL the High and Low Resolution Graphics, Sound, Play and String Operations available in Extended Color Basic, and all with 99.9% syntax compatibility.

CBASIC is FAST. Not only will CBASIC compiled programs execute 10 to 1000 times faster than Basic, but the time it takes to develop a CBASIC program versus writing a machine language program is much, much shorter. A machine language program that might take several months to write and debug could be created using CBASIC in a matter of days or hours, even for a well experienced machine language programmer. We had a report from a CBASIC user that claimed "a Basic program that used to take 3 hours to run, now runs in 7 to 8 minutes". Another user reported a program that took 1 to 1½ hours to run in Basic, now runs in 5 to 6 minutes!!!

MORE THAN JUST A COMPILER

CBASIC has its own completely integrated Basic Program Editor. The Editor contained in CBASIC is used to Create and/or Edit programs for the compiler. It is a full featured editor with functions designed specifically for writing and editing Basic programs. It has built-in block Move and Copy functions with automatic program renumbering. Complete, easy to use inserting, deleting, extending and overtyping of existing program lines. It is also used for Loading, Saving, Appending (merging), Killing disk files and displaying a Disk Directory. It also has automatic line number generation for use when creating programs or inserting sequencial lines between existing lines. You can set the printer baud rate and direct normal or compiled listings to the printer for hard copy. The built-in editor makes program corrections and changes as easy as "falling off a log". If CBASIC finds an error when compiling, it points to the place in the program line where the error occurred. All you have to do is tell the editor what line you want to start editing and when it is displayed, move the cursor with the arrow keys to the place where the error is and correct it. Just like that, it's simple.

HI-RES & 80 COLUMN DISPLAYS

CBASIC is the only Color Basic Compiler that includes its own Hi-Resolution 51, 64 or 85 by 24 line display. It is also the only compiler that supports both the PBJ "Word-Pak" and the Double Density 80 column cards. All of these display formats are part of the standard CBASIC compiler package. Not only can these display formats be used for normal program editing and compiling, but CBASIC will also include them in your compiled programs! If you want CBASIC to include the display driver in your program, all you have to do is use a single CBASIC command "HIRES". The run-time display driver that CBASIC includes in your program is not just a simple display, but a full-featured display package. With the Hi-Resolution display package you can mix text & graphics, change characters per line, underline, character highlight, erase to end of line or screen, home cursor, home & clear screen, protect screen lines, and much more. All commands are compatible with our HI-RES II Screen Commander so you can easily develop screen layouts using HI-RES and Color Basic before you compile your program. The same applies to using the 80 column card drivers. What other Basic compiler offers you this kind of flexibility?

64K RAM SUPPORT

CBASIC makes full use of the power and flexibility of the 6883 SAM (Synchronous Address Multiplexer) in the Color Computer. It will fully utilize the 96K of address space available in the Color Computer (64K installed) during program Creation, Editing and Compilation. CBASIC has a special command for automatic 64K RAM control. When used in a program, it allows the user to use the upper 32K of RAM space automatically for variables or even program storage at run-time. It will automatically switch the ROMs in and out when needed. There are also two other commands that allow you to control the upper 32K of RAM manually, under program control. No other Color Basic compiler directly supports the use of 64K RAM like CBASIC.

ALL MACHINE LANGUAGE

CBASIC is completely written in fast efficient Machine Language, not Basic, like some other Color Basic compilers. Because of this, CBASIC can edit and compile very large programs. Even using the Hi-Resolution 51 by 24 line display, it can work with about a 34K program, and the 80 column card versions can handle almost 40K of program. Some of the other Basic compilers can only work with 16K or about 200 lines. Even working with large programs, CBASIC compiles programs with lightning fast speed. It will compile a 24K program to disk in less than 2 minutes! That's without a listing being generated. We've heard stories about some other compilers that take almost 10 minutes to compile a simple 2-3K program. You might inquire about this when you look at some of the other compilers available.

THE FINISHED PRODUCT

Since CBASIC contains statements to support ALL of the I/O devices (Disk, Tape, Screen & Printer), Hi-Res Graphics, Sound, and Enhanced Screen displays, it is well suited for a wide range of programming applications. It generates a complete, Ready to Run machine language program. The finished product or program does not have to be interfaced to a Basic program to perform some of its functions or commands. This may seem obvious to you, but some of the other Color Basic compilers don't necessarily work this way. Some of their compiler commands need a separate Basic program in order for them to work. In some cases, require that a separate Basic program be interfaced to the compiled program to perform I/O functions, like INPUT, PRINT and so on. CBASIC doesn't do this. ALL of its commands are compiled into a single machine language program that does not require any kind of Basic program to make it work.

COMPATIBILITY

You may be wondering about those statements we made earlier concerning 99% or 99.9% syntax compatibility. What does that other 1% consist of? The biggest part of that 1% has to do with string arrays and variables. CBASIC does not use a "String Pool" like Color Basic. It uses absolute memory addresses to locate string variables and arrays. This is why CBASIC's string processing is so fast, it also eliminates the time consuming "Garbage Collection" problem. When CBASIC allocates space for strings, it must know how much space to use for each string. When you Dimension a string variable in CBASIC, you must tell it how much space you want to save for each element. To Dimension an array of 40 strings, 64 characters each, you would DIM DA$(40,64). If a string is not dimensioned, CBASIC will automatically allocate 32 bytes for it. If you want a single string to have enough room for 200 characters you would DIM AX$(200). For string arrays, you would still access the element you want, the same as Color Basic, to get string #30 from the array DA$, you would still use DA$(30), the only real change is in the DIM statement. For undeclared string arrays of 10 elements or less, CBASIC will automatically reserve space for 10 (0-9) strings of 32 characters. In some other Color Basic compilers, you have to declare EVERY string variable used in the progrm in a DIM statement. And, to create an array of 40 strings with 64 characters each, you would have to DIM AD$(2560), and then to access string #30, you would have to multiply 30 × 64 and use a special variable name format or access it one character at a time. Not very compatible or convenient to use, and difficult at best.

CBASIC REQUIREMENTS

CBASIC requires a minimum of 32K RAM and at least one Disk drive. We strongly recommend that you have 64K. CBASIC is compatible with all versions of Color & Extended Basic and both Disk Basic V1.0 and V1.1. Programs compiled on either system will run on systems with different ROMs. CBASIC is NOT compatible with JDOS.

DOCUMENTATION

The Documentation provided with any program is very important to the user. This is especially true when you talk about a program as complete and complex as CBASIC. Even though CBASIC was designed to be the most User Friendly compiler on the market, we went to great lengths to provide a manual that is not only easy to use and understand, but comprehensive and complete enough for even the most sophisticated user. The manual included with CBASIC consists of approximately 120 pages of real information, not like some manuals that put just one or two short paragraphs on a page. If we did it that way, we could have easily created a three or four hundred page manual. The manual index breaks down each section of the manual and gives a 3 or 4 word description of each section and its items along with page numbers. The manual has three sections, the Editor, Compiler and Appendix. Each of these is divided into subsections, with Section and Subsection titles printed at the top of each page. If you want to, you could find the information you are looking for by simply flipping through the pages and scanning the Section titles on the top of the pages. The Manual itself is an 8½ by 11 Spiral Bound book with durable leather textured covers. Some of the reports we have had from CBASIC users describe the manual as being the Best program manual they have ever used.

COMPARE THE DIFFERENCE

CBASIC is not just another Color Basic Compiler. It is the only complete Basic Compiler System for the Color Computer. Compare CBASIC's features to what other compilers offer and you'll see the difference. When comparing CBASIC to other compilers, you might want to keep some of these questions in mind. Does it support I/O functions? You can't write much of a program without PRINT, INPUT and so on. What about complex string statements, or string statements at all? How large of a program can you write? Can you compile a complex string like: MID$(RIGHT$(DA$(VAL(IN$),LEN(LE$)),3,3)? Can you use two character variable names for string & numeric variables, like Basic. Does it support all the Hi-Res graphics statements including PLAY, DRAW, GET and PUT, using the same syntax as Basic? Do you ever have to use a separate Basic program? Can you take complete Basic programs and compile them without extensive changes? Will they work? How do you edit a program when it has errors compiling?

PRICE VERSUS PERFORMANCE

The price of CBASIC is $149.00. It is the most expensive Color Basic Compiler on the market, and well worth the investment. We spent over 2 years writing and refining CBASIC, to make it the Best, most Compatible Color Basic compiler available. Most of our CBASIC users already bought one or more of the other compilers on the market and have since discarded them. We even traded in a few of them. If you want a cheap compiler, we'll sell you one of those traded in, at a good price. Before you buy a compiler, compare the performance of CBASIC against any Color Basic compiler. Dollar for Dollar, CBASIC gives you more than any other Color Basic compiler available.

ORDERING INFORMATION

To order CBASIC by mail, send check or money order in the amount of $140.00 plus $3.00 for shipping and handling to the address to the address listed below.

To order by VISA, MASTERCARD or COD, call us at: (702) 452-0632 (Monday thru Saturday, 8am to 5pm PST).

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```
750 GOTO630
760 CLS:PRINT@10,"save words"
770 IF P$="UPDATE" THENPRINT"YOU
 MUST NAME THIS FILE ";: FOR I=2
380 TO 2387:PRINTCHR$(PEEK(I));:
NEXT I
780 PRINT@96,"WHAT WOULD YOU LIK
E TO":INPUT"CALL THIS FILE";S$
790 IF LEN(S$)>8 THEN PRINT"8 LE
TTERS OR LESS PLEASE":FOR G=1TO1
000:NEXT G:GOTO760
800 OPEN"O",#1,S$
810 FOR X=1TO D
820 WRITE #1,A$(X)
830 WRITE #1,B$(X)
840 NEXT X
850 CLOSE#1
860 P$=""
870 GOTO70
880 CLS:PRINT@10,"load words"
890 PRINT@96,"WHAT IS THE NAME O
F":INPUT"THE FILE";S$
900 IF LEN(S$)>8 THEN PRINT"8 LE
TTERS OR LESS PLEASE":FOR P=1TO1
000:NEXT P:GOTO880
910 OPEN"I",#1,S$
920 CLEAR4000
930 CLEAR:DIM A$(50):DIM B$(50)
940 X=1
950 IF EOF(1)=-1 THEN 1000
960 INPUT #1,A$(X)
970 INPUT #1,B$(X)
980 X=X+1
990 GOTO950
1000 CLOSE#1
1010 D=X-1
1020 OO=D
1030 GOTO70
1040 CLS:PRINT@10,"update file";
1050 PRINT@128,"WHICH FILE DO YO
U WANT";:PRINT@160,"";:LINE INPU
T"TO UPDATE?";S$
1060 IF LEN(S$)>8 THEN PRINT"8 L
ETTERS OR LESS PLEASE":FOR B=1TO
1000:NEXT B:GOTO1040
1070 OPEN"I",#1,S$
1080 CLEAR4000
1090 DIM A$(50):DIM B$(50)
1100 X=1
1110 IF EOF(1)=-1 THEN1160
1120 INPUT #1,A$(X)
1130 INPUT #1,B$(X)
1140 X=X+1
1150 GOTO1110
1160 CLOSE#1
1170 F=X
1180 P$="UPDATE"
1190 OO=D
1200 GOTO170
1210 PRINT@128,"WOULD YOU LIKE M
E TO          1>GIVE YOU THE W
ORD             AND YOU GIVE T
HE              DEFINITION
              2>GIVE YOU THE D
EF-             INITION AND YO
U               GIVE ME THE WO
RD"
1220 PRINT@384,"";:INPUT"WELL";A
1230 IF A<1 OR A>2 THEN 1220
1240 GOSUB1440
1250 IF A=1 THEN CLS:PRINT@8,"vo
cabulary test":RETURN
1260 CLS:F=0:P=0:L=1
1270 FOR X=1 TO D:CLS
1280 CLS:PRINT@8,"vocabulary tes
t"
1290 PRINT"TYPE <XX> TO STOP TES
TING"
1300 PRINT@128,B$(X);:LINE INPUT
"=";S$
1310 IF S$="XX" THEN QQ=3:X=X-1:
GOTO530
1320 IF S$=A$(X) THEN 1400
1330 IF M=1 THEN P=P+1:GOTO1280
1340 CLS3:PRINT@106,"WRONG!!!!!!
";
1350 PRINT@197,"THE CORRECT ANSW
```

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```
ER IS":PRINT@230,A$(X)"!!!!"
1360 SCREEN0,1:PLAY"O1T10L3ET5L1
D"
1370 FOR A=1TO1000:NEXT A
1380 NEXT X
1390 GOTO530
1400 CLS5:PRINT@233,"CORRECT!!!"
;:SCREEN0,1
1410 F=F+1:FOR Y=1TO10:POKE65344
,1:K=RND(255):L=RND(5):SOUND K,L
:POKE 65344,2:Z=RND(8):CLS Z:PRI
NT@233,"CORRECT!!!!!";:NEXT Y
1420 NEXT X
1430 GOTO530
1440 CLS:PRINT@224,"WOULD YOU LI
KE ME TO            1>GIVE YOU T
HE QUESTION AGAIN     IF YOU GET
 IT WRONG            2>JUST TELL
 YOU THE RIGHT         ANSWER AN
D GO ON TESTING."
1450 PRINT@384,"WE";:INPUT"LL";M
1460 IF M>2 OR M<1 THEN 1440
1470 RETURN
1480 CLS:PRINT@10,"print file"
1490 I=(PEEK(65314)AND1)
1500 IF I=1 THEN PRINT"TURN ON Y
OUR PRINTER":O=9
1510 PRINT#-2,CHR$(19)
1520 PRINT#-2,CHR$(27);CHR$(14)
1530 I=(PEEK(65314) AND 1)
1540 IF I=0 AND O=9 THEN PRINT"T
HANKS!!"
1550 O=0
1560 PRINT@128,"WHICH FILE WOULD
 YOU":LINE INPUT"LIKE TO PRINT O
UT?";R$
1570 IF LEN(R$)>8 THEN PRINT"8 L
ETTERS OR LESS PLEASE":FOR P=1TO
1000:NEXT P:GOTO1480
1580 R=LEN(R$):Z=21-R/2:PRINT#-2
,TAB(Z)
1590 PRINT@230,"printing......"
1600 PRINT#-2,R$:PRINT#-2,TAB(16
):PRINT#-2,"VOCABULARY"
1610 PRINT#-2,CHR$(27);CHR$(15)
1620 FOR T=1TO 2:PRINT#-2,CHR$(1
3):NEXT T
1630 OPEN"I",#1,R$
1640 CLEAR4000
1650 DIM A$(50):DIM B$(50)
1660 X=1
1670 IF EOF(1)=-1 THEN 1730
1680 INPUT#1,A$(X)
1690 INPUT#1,B$(X)
1700 PRINT#-2,X;A$(X)"="B$(X)
1710 X=X+1
1720 GOTO1670
1730 CLOSE #1:X=0:GOTO60
```

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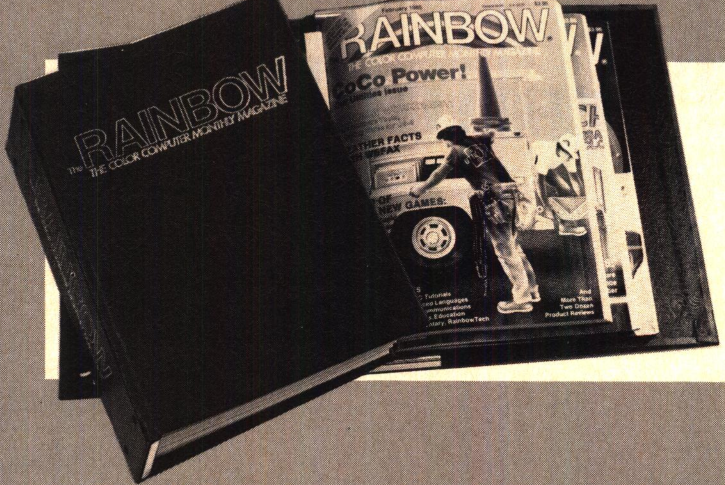

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Music And A Terminal Program, Too?

By R. Wayne Day
Rainbow Contributing Editor

This summer has been an exciting one in the world of CoCo telecommunications. Tandy has released a new product that includes a "semi-smart" terminal program as an integral part of the product and a new revision of a popular terminal program has also been released.

In June, Tandy finally released the long-rumored *Orchestra 90/CC* program pack, a music synthesizer for the CoCo, and already it's generating a lot of interest on CompuServe and on many BBSs across the country.

I'll leave the review of the musical capabilities of *Orchestra 90* for someone more capable, but I would like to discuss the abilities of the on-board terminal program in *Orchestra*. In general, though, *Orchestra 90* provides a method of generating music in stereo using your computer.

One of the advantages of *Orchestra 90* is the ability to share (via bulletin boards and a special *Orchestra* SIG on CompuServe [Page PCS-15]) "source files," the text-like data that is compiled by the program to produce the actual sounds.

The programmers also included the ability to use the program as a terminal that's capable of downloading and uploading the files to a BBS or CompuServe, using the normal RS-232 port on the CoCo at 300 Baud and utilizing what's commonly known as the capture buffer protocol (also known as Control-R/Control-T or DC2/DC4). That protocol is simply a way of saying the BBS sends a Hex 12 just prior to sending the music data, following with a Hex 14 when the data has finished. Those control characters tell many terminal programs to open and close the buffer so the terminal "captures" the data into memory.

If you've followed my columns in the past, you'll know I'm not overly fond of relying on a process that does not support some form of error-checking and error-correction when downloading or uploading important files. For my purposes, "important" is defined as something I'm not going to immediately discard after using once.

Additionally, the state of the telecommunications art in the CoCo world has progressed. A good portion of the folks who are using their Color Computers to telecommunicate are no longer relying on 300 Baud from the built-in RS-232 port, but are using the hardware in the RS-232 ROM pack and beginning to use 1200 Baud effectively, as well.

One other situation when using the built-in terminal program in *Orchestra* could cause some problems for the unwary. The files stored on disk or tape by *Orchestra* are not normal ASCII files. There are no carriage returns stored internally, plus the first characters of what should be a new line are modified. All of this adds up to the fact that more than one person has already attempted to upload an *Orchestra* music source file to the Color SIG in an improper format, plus the user who believes he can download music files with his "normal" terminal program, then use them in *Orchestra* has found it doesn't work.

Enter *OCNVRT.BIN* (and *OCNVRT.BAS*), a program written by Mike Ward, an assistant SysOp of the Color SIG and the author of *Mikeyterm*. Mike has created a conversion utility that allows *Orchestra 90/CC* files to be uploaded and downloaded by a terminal program other than the one *Orchestra* contains. This allows the use of an error-checking protocol (XMODEM, CIS 'B' Protocol, DFT, etc.) as well as the use of 1200 Baud transmissions.

OCNVRT.BAS is a BASIC loader that creates the disk version of *OCNVRT.BIN*, and is presented at the end of this column. It has been released into the public domain by Mike, and you should feel free to share it with whomever has a use for it. It is also available for downloading from The Color SIG as well as the *Orchestra 90* SIG on CompuServe. *OCNVRT.BIN* is com-

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(Wayne Day, a traffic engineering technician for the city of Fort Worth, Texas, is the SysOp of The Color SIG on CompuServe, the oldest CoCo communications service in the nation. Active in emergency medicine as a paramedic, he is also an amateur radio operator [WA5WDB].)

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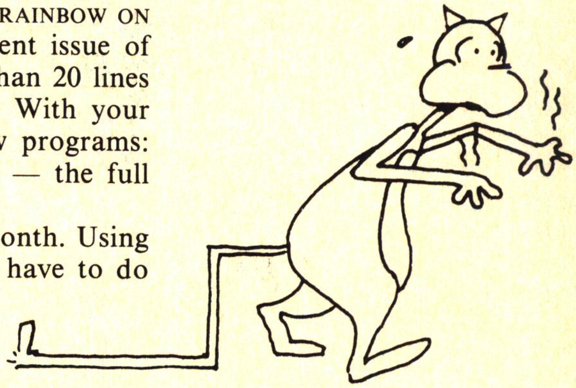

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September 1984 — *Clock*, a program that teaches youngsters how to tell time; *Mad Adder*, a game of logical math; *The ABC Game*, a learning tool for preschoolers with a musical reward; *Word Scrambler for Spelling Lists*, an entertaining drill for assigned words; *CoCo School Marm, Part I*, a computer-controlled tape recorder for audio pronunciation and spelling. Also, two geography games, an investment interest display, a disk mailing list program and programs dealing with BASIC and PASCAL.

September 1983 — *Random Lab Scheduler*, a program to help teachers schedule students when they don't have enough lab stations; *Ruler Reader*, a program that reinforces measuring skills; *The Write Idea*, an aid in developing composition topics; *Color Math Quiz*, a math drill for preschool through junior high school students; *Convert*, an easy method for conversion to the metric system; *Grade Averaging*, a teacher's helper for grades; and *Bibliography File*, a storehouse of information on term papers, reports and lectures with easy access. Plus, a geometric graphics program, a hidden word game, valuable information on the 103 known elements, a music program for the high-tech piano player and a utility on machine language programming.

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patible only with disk systems at this time. A cassette version may be in the works in the future.

By the way, lest anyone think I'm taking unfair potshots at Bryan Eggers and Software Affair, Ltd., the producers of *Orchestra 90/CC*, rest assured that I agree with Bryan's thinking — a terminal program that would at least allow the sharing of *Orchestra* files would be better than no integral terminal program at all. It came down to a problem of space, since the entire *Orchestra 90/CC* program is contained on one 2764 EPROM (that's a 64K-by-1 EPROM), which leaves very little room left over.

> ***". . . the state of the telecommunications art in the CoCo world has progressed . . . folks are beginning to use 1200 Baud effectively . . ."***

They have produced one heck of a program, and coupled with Mike's *OCNVRT* utility, it has been one of the more enjoyable programs I've used on the CoCo in a long time.

New XMODEM Terminal Programs

Speaking of XMODEM, *COLOR COM/E*, Disk Version 3.0, written by Mark Davidsaver of Eigen Systems, has added XMODEM support in this very popular terminal program.

COLORCOM/E, if you weren't aware, was one of the very first "smart terminal" programs for the CoCo. The current version, with its 51-by-24 graphics screen, flexible auto-log capabilities and excellent user interface, coupled with XMODEM support, puts this program high up on the list of recommended terminal programs.

It is available from Spectrum Projects as well as other dealers, and upgrades for current *COLORCOM/E* owners should be available.

New for OS-9

OS-9 is not left out of the new breed of CoCo communications utilities, with the arrival of *OTERM*, by New World Technologies of Dublin, Ohio.

Bernie Pluth, the author of *OTERM*, has put together a program that supports automatic and manual control of a user-settable buffer (the buffer size depends on how much available memory you have when *OTERM* is loaded), XMODEM support for uploading and downloading, as well as a very flexible method of defining function keys and user options. Like most of the newer OS-9 terminal programs, it does require the use of the RS-232 ROM pack. Look for their ad in this month's RAINBOW.

***Word-Pak* Compatible Terminal**

The newest version of *Mikeyterm* (Version 3.5) supports both the PBJ *Word-Pak I* and *II* as well as the normal 32-by-16 screen of the CoCo. An upgrade to Version 2.5 (requiring the RS-232 ROM pack for use at 300 or 1200 Baud), this version continues the public domain heritage of the program, and has been making its way through the many BBSs that are distributing the program through their download sections.

Mikeyterm Version 3.5 is also available on The Color SIG on CompuServe as *MTER35.BIN* in the DL4 (Telecommunications) database.

Hurricane Season and the CoCo

A letter from Donald J. Kay of Key West, Fla. ("Letters to Rainbow," July 1985, Page 6), pointed out that the *WEFAX* program (RAINBOW, February 1985, Page 42) allows the CoCo to be put to extremely good use by hooking it up to a shortwave receiver to capture weather maps from the various *WEFAX* stations around the world.

Here are some of the various shortwave frequencies where weather maps normally can be received. The following *WEFAX* stations normally transmit 24 hours daily, though actual reception on a particular frequency may not be consistent for your location all of that time. The maps, though, are simulcast — that is, the station will normally be transmitting the same map on all of the frequencies it uses at the same time.

There have been several modifications to the original *WEFAX* program to support printers other than the Epson (the original version), as well as machine language versions of the program which load almost instantly (versus the 30 or so seconds the BASIC versions take to get going). Versions are currently available for the Gemini, Okidata 92 and Radio Shack DMP-110/DMP-120 series printers (this version will *not* work with a DMP-105), as well as the Epson with Graftrax.

Both the normal and fast-loading versions are available from the author of the original program: Marty Goodman, 1633 Bayo Vista Avenue, San Pablo, CA 94806, as well as being available on many BBSs and The Color SIG on CompuServe. For those who are ordering any of the versions from Marty, enclose a disk, prepaid return mailer and $10 for handling.

Letters

In the last two months, I've been reminded that THE RAINBOW truly is an international magazine, thanks to notes from Europe and South America.

From Buenos Aires, Argentina, Alejandro Perco is a CoCo owner who's looking for bulletin boards and database services that are linked through the ITT/GTE Telenet packet communications network he can hook up to. Besides CompuServe and The Source, both of which are accessible through Telenet, there are numerous other commercial database services available.

If you're running a bulletin board that's accessible through Telenet and might enjoy some real "DX" (that's amateur radio talk for long distance communications), let me know, and I'll pass the information along to Alejandro.

For other readers outside the United States who might be interested in getting online with one of these information utilities, a check with your local PTT (Post, Telephone and Telegraph) or communications network office should provide information on how to gain access to the international packet switching networks, thus access to The Source and CompuServe.

From Boissise Le Roi, France, Les Kalemkarians mentions that there's a group of CoCo enthusiasts who are becoming more active online, as well as learning the OS-9 operating system.

Now I'm wondering if there are any foreign CoCo BBSs out there that American enthusiasts might be interested in calling? If you know of one, or better still, if you operate one that is capable of being accessed with U.S. standard modems (European systems normally use the CCIT standard tones, which are different from the American standard of modems), please let me know and I'll pass the information along.

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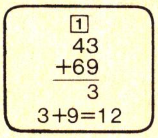

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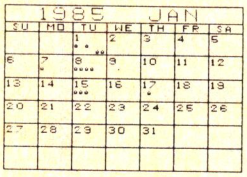

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RAINBOWfest-Princeton

As you're probably aware of by now, the location and dates of the next RAINBOWfest have been changed to Princeton, N.J., October 11-13. Again, I'll be honored to present a seminar on CompuServe and the Color SIG and, while the major focus of the seminar will be on the CIS System, we always manage to include a pretty good discussion of local BBS systems and general telecommunications techniques as well.

The Color SIG will also be moving its headquarters to Princeton for the weekend, where we'll be demonstrating the system, and have plenty of folks there to give you some one-on-one help. I hope we'll see you there!

Some BBS Topics

To close this month, I'd like to discuss a few things that are primarily of interest to SysOps of BBS systems; there are more of you out there each day! As you know, each of the BBS listings published in this column are called and verified to be operational prior to being published. This culls out the boards publicized prior to going online, but that never really make it; it doesn't prevent listings from systems that go down after it has been verified, but before the publishing of the information.

In addition, the lead time for this column is two months prior to the cover date and, though this is a shorter time than most magazine deadlines, it still is significant, since my experience has been that most systems that go offline do so in the first three months of operation. Please try to understand if we don't get a chance to help you publicize your board in the first 30 days it's online. If you can hang in there, you'll notice quite a bit of difference after the listing comes through.

One thing I've noticed while calling BBS systems across the United States and Canada is that many SysOps are not quite putting themselves in the position of long-distance callers. Consider three things that make life a lot easier for callers outside of your normal coverage area:

A) Be sure to identify both your system and location on your initial screen. Notice the systems listed with a city of "unknown" in the current update. Even with looking at the information files and the system bulletins, I was unable to find out just where the BBS is located.

B) Consider granting as much initial access to your system as possible while still maintaining security for your system. For example, my BBS, TBBS Fort Worth, allows new users 20 minutes of access time and full access to all of the facilities of the BBS, with the exception of leaving messages visible to the public, uploading files and changing their password. This gives the unregistered user a chance to see whether he wants to call your system again (which is what you're after, isn't it?) without taking the chance of profane public messages. Once you've got your long-distance caller hooked on what you have to offer, you've got someone who really *wants* to call your BBS!

C) Finally, consider keeping the amount of "new user" information someone is required to read at a minimum. This helps the caller to get into the "meat" of your system as soon as possible. For example, one BBS I recently called had no less than eight minutes worth of "required reading" prior to getting access to a menu which left me with one option — logging off! Needless to say, that's one board I probably won't call back.

Let's face it, one of the primary reasons most folks operate BBS systems is not only to provide information to

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Dolch Words	90-5220	Cassette	$8.95
	90-5221	Disk	$10.95
Keyboard Phonic Drill	90-5222	Cassette	$8.95
	90-5223	Disk	$10.95

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as many people as possible, but to receive as much diverse information as we can. That means we love to have users call long distance, since it gives us a chance to see what folks are thinking about. The more user friendly we make our systems, the better chance we can offer a system that makes a long-distance user want to call back.

Thinking about the Future

While some folks are having problems accepting the idea that 1200 Baud may have a valid place in the operating techniques of CoCo telecommunicators, there are several BBS systems now offering the choice of using 2400 Baud dial-up lines. A new generation of smart modems, led by the U.S. Robotics Courier 2400, is beginning to find its way into the hearts of BBS users and SysOps.

USR decided that one way to get the word out to many of their potential customers would be to offer local BBS SysOps the opportunity to purchase a 2400 Baud modem at a very substantial discount. While I was unable to get definite word whether this promotion will still be in effect by the time you read this, preliminary information is that it will. So, if you're currently running a BBS at 1200 Baud and wish to upgrade to 2400 Baud, you might want to contact U.S. Robotics at 800-342-5877 (800-DIAL USR) and inquire as to whether you qualify for their offer.

Will 2400 Baud be of any advantage to CoCo users? It surely is, when you consider file transfer times will be twice as fast as at 1200 Baud, or eight times as fast as at 300 Baud.

Will everyone ever go to 2400 Baud? It's my guess, at least for the foreseeable future, the majority of personal computer owners will continue to operate at 300 Baud, with a fairly good percentage operating at 1200 Baud (I see about 20 percent of the TBBS users operating at 1200 Baud) and a dedicated few operating at 2400 Baud. But, as the future draws nearer, technology will continue to decrease the cost of high speed modems (witness Radio Shack's DC2212 at less than $400) and users will begin to demand more from their systems, so I see a day when those percentages could shift appreciably.

A final thought: While there are several terminal programs now available which attempt, and even somewhat succeed in supporting 1200 Baud through the normal RS-232 port on the CoCo, the "bit banger" approach will never work at 2400 Baud full duplex. You can bet that programmers of terminal programs, if they hope to keep up with the future, should be looking at the probability of supporting a hardware UART like the one contained in the RS-232 ROM pack for those high-speed terminal programs.

Now, if someone would come up with a fiber-optics RS-232 port for my CoCo!

(As always, I can be contacted through TBBS Fort Worth (817) 232-2087 (300/1200 or 2400 Baud), CompuServe (ID= 76703,376) or directly at: P.O. Box 79074, Fort Worth, TX 76179-0074. Please enclose a SASE if you desire a direct reply.)

Station	Frequencies (kHz)
NAM - Norfolk, VA	3357, 4975, 8080, 10865, 16410, 20015
NMC - Point Reyes, CA	4346, 8682, 12730, 17151
WWD - LaJolla, CA	8646, 17411
CFM - Ontario, Que	10534
Various ham stations	14245 (Sunday afternoons)

BBS Addendum September 1985
Verification dates May - June 1985
+ = 300/1200 Baud

New Listings

Number	BBS	Location	Remarks
201 469-5409	Village BBS	Middlesex, NJ	
203 229-6481 +	Cool Coco 09	Kensington, CT	
206 425-2576	KWCBBS	Longview, WA	
209 239-6710	Color Clinic	Manteca, CA	
213 773-9407	COBBS #8	Los Angeles, CA	
215 768-0699	COBBS	Devon, PA	
315 986-4828	Color-80 #12	Rochester, NY	
319 277-0646	Computer Caller	Cedar Falls, IA	
319 396-8875	Bloom County Herald	Cedar Rapids, IA	
404 924-1248 +	CocoServe	Acworth, GA	
413 532-9631	CocoNut	Chicopee, MA	
414 699-3214	Color-80	Watertown, WI	
415 364-2658	Redwood Color Board	Redwood City, CA	
501 735-5614 +	COBBS #1	West Memphis, AR	Add 1200 Baud
502 937-4594	Colorama	Louisville, KY	
504 885-5619	Starbase 6809	New Orleans, LA	
512 674-0264	SA Color Board	San Antonio, TX	
513 399-1262	Colorama	Springfield, OH	
612 434-9186	The Outhouse	unknown	1500-0800 weekdays
615 839-3130	Colorama	unknown	
616 345-0536	Sunburst	unknown	
617 879-4086	Gator Bowl	Framingham, MA	
703 631-8577	Shadow*Keep	unknown	
703 680-3075 +	Colorama	Dale City, VA	
713 426-7070	Color-80 #51	Highlands, TX	eve - weekends
713 923-6809	Coco Loco	Houston, TX	
713 941-1542	Golden Coco	Houston, TX	
801 627-3453	Time Link	Clearfield, UT	New number
804 862-4663	Three Musketeers	Petersburg, VA	
816 232-4932	Dragon's Lair	St. Joseph, MO	
818 335-6554	Color America	Ventura, CA	New number
Corrections/Deletions			
212 825-XXXX	Colorama	Governers Ils, NY	Moved
215 277-6951	My BBS	Norristown, PA	Add location
504 277-XXXX	NO Color BBS	New Orleans, LA	Now offline
801 544-XXXX	Time Link	Clearfield, UT	New number above
816 232-XXXX	The Pony Express	St. Joseph, MO	Now offline

19	109
28	62
35	77
43	183
50	141
58	34
65	250
73	16
80	197
88	105
END	91

The listing: OCNVRT

```
1 CLS:PRINT"WHEN YOU HAVE A DISK
 READY":PRINT"FOR SAVING THE PRO
GRAM"
2 INPUT"HIT <ENTER>";H$
3 CLS:PRINT"POKING M/L...":SA=&H
F00
4 CK=0
5 FOR I=1 TO 32
6 READ H$:IF H$="X" THEN 15
7 PRINT@206,HEX$(SA)
8 POKE SA,VAL("&H"+H$)
9 CK=CK+PEEK(SA):SA=SA+1
10 NEXT I
11 READ I
12 IF I=CK THEN 4
13 PRINT:PRINT"CHECKSUM ERROR!"
14 STOP
15 SAVEM"OCNVRT",&HF00,&H186C,&H
F2C
16 PRINT:PRINT"YOUR COPY OF ";:P
RINTCHR$(34);:PRINT"OCNVRT";:PRI
NTCHR$(34)
17 PRINT"HAS BEEN SAVED TO DISK.
":PRINT
18 END
19 DATA B6,9,82,27,8,BE,9,83,AF,
6A,7F,9,82,3B,B6,FF,3,2A,18,B6,F
F,2,B6,9,85,27,10,7A,9,85,26,B,2
941
20 DATA B6,9,86,84,B0,B7,9,86,B7
,FF,40,3B,1A,50,10,CE,E,FF,10,DF
,27,8E,F,0,BF,1,A,8E,F,E,BF,1,31
17
21 DATA D,CC,30,FA,B7,FF,23,F7,F
F,22,CC,35,34,F7,FF,23,B7,FF,3,F
7,FF,1,F7,FF,21,BE,17,7E,BF,17,8
0,BF,4721
22 DATA 17,86,BF,17,82,BF,17,84,
7F,16,F4,BD,18,1,FC,C0,0,10,83,4
4,4B,10,26,7,43,7F,17,65,7F,16,F
5,B6,3143
23 DATA C1,42,81,30,26,5,7F,16,F
5,20,A,B6,C1,55,81,31,26,3,73,16
,F5,1C,AF,10,DE,27,BD,A9,28,BE,1
,8F,3188
24 DATA 8C,15,FB,27,17,B6,1,8E,B
7,16,F9,BE,1,8F,BF,16,FA,86,7E,B
7,1,8E,8E,15,FB,BF,1,8F,BD,A4,2D
,F,3798
25 DATA 78,8E,17,59,C6,B,6F,80,5
A,26,FB,BE,17,7E,BF,17,80,C6,1F,
F7,17,5E,F7,17,5F,7D,17,64,26,B,
86,FF,3526
26 DATA B7,17,64,8E,17,8C,17,6,0
,BD,16,33,BD,16,60,49,6E,70,75,7
4,0,BD,13,E9,96,EB,B7,17,66,B6,1
6,FC,3327
27 DATA B7,17,61,8E,9,4C,EC,84,1
0,83,5E,5E,10,27,6,D4,10,8E,17,6
7,C6,B,A6,80,A7,A0,5A,26,F9,BD,1
6,60,3304
28 DATA 4F,75,74,70,75,74,0,BD,1
3,E9,96,EB,B7,17,72,B6,16,FC,B7,
17,62,8E,9,4C,10,8E,17,73,C6,B,A
6,80,3589
29 DATA A7,A0,5A,26,F9,8E,17,67,
10,8E,9,4C,C6,B,A6,80,A7,A0,5A,2
6,F9,B6,17,66,97,EB,B6,17,61,B7,
16,FC,3874
30 DATA 7E,10,A9,8E,17,73,10,8E,
9,4C,C6,B,A6,80,A7,A0,5A,26,F9,B
6,17,72,97,EB,B6,17,62,B7,16,FC,
7E,10,3648
31 DATA EF,BD,16,60,D,41,6E,6F,7
4,68,65,72,20,66,69,6C,65,3F,20,
28,59,2F,4E,29,20,0,BD,A1,B1,BD,
16,28,2928
32 DATA 81,59,10,27,FE,F1,7E,16,
E4,17,1,2,10,27,FE,E7,BE,17,86,B
F,16,F7,7F,16,F4,17,1,4B,7D,17,6
3,27,3295
33 DATA 12,BE,16,F7,30,1F,A6,80,
81,D,27,7,86,D,A7,80,BF,16,F7,BE
,16,F7,BC,17,88,23,8,8E,10,81,34
,40,3192
34 DATA 16,2,CE,BF,17,80,BF,17,8
4,BD,16,33,16,FF,74,8D,1D,10,27,
FE,A2,BE,17,86,7D,16,F4,27,3,BE,
17,82,3337
35 DATA BF,16,F7,8E,11,8,34,10,1
7,0,73,16,FF,73,7D,16,FC,10,27,2
,CA,7D,16,F5,26,5,BD,C6,5F,20,3,
BD,3024
36 DATA C6,8C,7D,9,73,27,3F,BD,1
6,60,D,46,69,6C,65,20,61,6C,72,6
5,61,64,79,20,65,78,69,73,74,73,
2E,D,2926
37 DATA 4F,76,65,72,2D,57,72,69,
74,65,20,69,74,3F,20,20,28,59,2F
,4E,29,20,0,BD,A1,B1,BD,16,28,BD
,A3,A,2827
38 DATA 81,59,10,26,FF,1B,F,70,8
E,1,FF,BF,9,57,7D,16,F5,26,5,BD,
C9,56,20,3,BD,CA,4,16,2,68,BE,16
,3047
39 DATA F7,A6,80,7D,16,F4,27,5,B
C,17,84,20,3,BC,17,80,10,22,2,4F
```

```
,BF,16,F7,7D,16,F5,26,5,BD,CB,52
,20,3225
40 DATA 3,BD,CC,24,D,70,27,D6,8E
,17,2A,16,2,26,7D,16,FC,10,27,2,
2A,7D,16,F5,26,5,BD,C6,5F,20,3,B
D,2718
41 DATA C6,8C,7D,9,73,26,6,8E,17
,E,16,2,9,7D,16,F5,26,5,BD,C9,59
,20,3,BD,CA,7,FE,9,57,11,83,1,26
89
42 DATA FF,26,3,86,1,39,BD,16,60
,D,4E,6F,74,20,61,20,76,61,6C,69
,64,20,46,69,6C,65,20,74,79,70,6
5,20,2732
43 DATA 0,BD,A1,B1,16,FE,7A,17,1
,B2,7D,17,59,10,26,0,95,C6,FF,F7
,17,59,34,2,1F,89,58,24,48,C6,FF
,F7,3497
44 DATA 17,63,BD,16,60,46,69,6C,
65,20,69,73,20,4F,52,43,48,20,66
,6F,72,6D,61,74,D,43,6F,6E,76,65
,72,74,2828
45 DATA 20,74,6F,20,41,53,43,49,
49,3F,20,28,59,2F,4E,29,20,0,BD,
A1,B1,BD,16,28,BD,A3,A,81,59,10,
26,FE,2740
46 DATA 20,35,2,20,41,BD,16,60,4
6,69,6C,65,20,69,73,20,41,53,43,
49,49,20,66,6F,72,6D,61,74,D,43,
6F,6E,2502
47 DATA 76,65,72,74,20,74,6F,20,
4F,52,43,48,3F,20,28,59,2F,4E,29
,20,0,BD,A1,B1,BD,16,28,BD,A3,A,
81,59,2820
48 DATA 10,26,FD,DD,35,2,BE,16,F
7,7D,17,63,27,69,1F,89,58,24,33,
81,80,26,11,C6,D,E7,80,BC,17,88,
10,22,3055
49 DATA 0,EF,BF,16,F7,16,1,1B,7D
,17,60,27,B,C6,D,E7,80,BC,17,88,
10,22,0,D9,C6,FF,F7,17,60,7F,17,
5B,3287
50 DATA 81,80,27,1F,84,7F,81,60,
25,2,84,BF,81,2F,26,13,7D,17,5B,
26,E,C6,20,F7,17,5B,E7,80,BC,17,
88,10,3010
51 DATA 22,0,AE,A7,80,C6,FF,F7,1
7,5B,BC,17,88,10,22,0,A0,BF,16,F
7,16,FE,F0,81,1A,10,27,0,C6,81,A
,10,3413
52 DATA 27,FE,E4,81,D,26,E,7F,17
,5A,C6,1F,F7,17,5E,F7,17,5F,16,F
E,D2,81,3F,22,6,81,20,25,2,8A,40
,81,3162
53 DATA 6F,26,19,B7,17,5A,F6,17,
5F,C1,1E,26,F,30,1F,E6,80,C1,E0,
26,7,86,EF,30,1F,7C,17,5F,7D,17,
5E,27,2984
54 DATA 5,8A,80,7F,17,5E,A7,80,B
C,17,88,10,22,0,42,BF,16,F7,7A,1
7,5F,10,26,FE,8E,7D,17,5A,27,28,
8D,3C,2941
55 DATA 81,D,10,27,FE,84,C6,EF,E
7,80,BC,17,88,10,22,0,20,A7,80,B
C,17,88,22,19,BF,16,F7,C6,1D,F7,
17,5F,3561
56 DATA 7F,17,5E,16,FE,61,86,1F,
B7,17,5E,B7,17,5F,16,FE,56,8E,17
,1D,8D,20,BD,A1,B1,16,FC,C5,7D,1
6,F5,26,3540
57 DATA 5,BD,C5,97,20,3,BD,C5,C4
,D6,70,27,13,C1,FF,27,10,8E,17,2
A,32,62,17,2,10,BD,A1,71,BD,A4,2
D,4F,3382
58 DATA 39,32,62,BD,A4,2D,86,1,3
9,8E,16,FE,CE,9,54,C6,3,BD,16,20
,8E,17,1,17,1,EF,7F,16,FC,B6,1,1
A,2995
59 DATA B7,16,F3,86,FF,B7,1,1A,B
D,A3,93,34,1,B6,16,F3,B7,1,1A,35
,1,10,25,FB,7E,C1,2,10,25,FB,78,
5A,3449
60 DATA F7,16,FC,B6,9,5A,97,EB,8
E,9,4C,CC,20,8,A7,80,5A,26,FB,F6
,16,FC,8E,2,DD,CE,9,4C,C1,1,27,2
C,3786
61 DATA A6,80,27,17,81,2F,27,14,
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81,2E,27,10,81,3A,27,1C,11,83,9,
56,22,5,A7,C0,5A,26,E5,39,CE,9,5
4,34,2481
62 DATA 6,CC,20,20,ED,C4,A7,42,3
5,6,20,EC,A6,84,81,30,10,25,FB,2
3,81,33,10,22,FB,1D,84,3,97,EB,B
6,16,3316
63 DATA FC,81,1,26,D6,BD,A9,28,8
E,4,7,9F,88,BD,16,60,52,65,61,64
,69,6E,67,20,44,69,72,65,63,74,6
F,72,3345
64 DATA 79,0,8E,4,0,9F,88,BD,15,
7D,7F,16,FD,86,D,B7,15,3,BE,16,E
F,A6,84,4C,10,27,0,87,86,20,C6,C
,3044
65 DATA CE,14,F6,A7,C0,5A,26,FB,
C6,8,CE,14,F6,BD,16,20,86,2E,A7,
C0,C6,3,BD,16,20,B6,15,3,81,D,27
,4,3505
66 DATA 86,D,20,2,86,AF,B7,15,3,
B6,1,1A,34,12,7F,1,1A,BD,16,60,2
0,20,20,20,20,20,20,20,20,20,20,
20,1821
67 DATA 20,20,20,D,0,35,12,B7,1,
1A,30,88,15,7C,16,FD,86,1C,B1,16
,FD,22,9E,7F,16,FD,86,D,B7,15,3,
34,2608
68 DATA 10,BD,16,60,20,2A,2D,4D,
6F,72,65,2D,2A,20,0,BD,A1,B1,81,
3,10,27,FA,5F,DC,88,C4,E0,DD,88,
35,10,3225
69 DATA 16,FF,72,7F,16,F6,C6,44,
BE,16,ED,A6,80,81,FF,26,3,7C,16,
F6,5A,26,F4,86,D,B1,15,3,27,3,BD
,A3,3726
70 DATA A,BD,16,60,46,72,65,65,2
0,47,72,61,6E,75,6C,65,73,20,0,4
F,F6,16,F6,BD,16,75,16,FE,6C,86,
2,97,3192
71 DATA EA,CC,11,1,DD,EC,BE,16,E
D,30,89,FF,0,BF,17,8A,8E,17,8C,9
F,EE,96,ED,4C,97,ED,81,B,22,25,7
C,17,4065
72 DATA 8A,7D,16,F5,26,5,BD,D5,F
F,20,3,BD,D6,F2,34,36,5F,8E,17,8
C,10,BE,17,8A,A6,80,A7,A0,5A,26,
F9,35,3834
73 DATA 36,20,D2,BE,16,EF,30,88,
E0,FE,16,EF,30,88,20,A6,84,27,F9
,4C,27,7,C6,20,BD,16,20,20,F2,CC
,FF,FF,4055
74 DATA ED,C1,11,B3,16,F1,25,F8,
39,A6,80,27,D,7D,1,1A,27,3,BD,16
,28,BD,A3,A,20,EF,39,34,4,BD,A4,
2D,3166
75 DATA 35,4,54,5C,8E,17,34,C1,1
F,27,A,8E,17,4C,C1,1D,27,3,8E,17
,2A,8D,D2,7F,FF,40,BD,A1,B1,16,F
9,77,3149
76 DATA A6,80,A7,C0,5A,26,F9,39,
81,60,23,6,81,7A,22,2,84,5F,39,8
D,2B,D,46,72,65,65,20,20,0,FC,17
,88,2982
77 DATA B3,17,80,8D,30,8D,19,20,
20,20,20,20,55,73,65,64,20,0,FC,
17,80,B3,17,86,8D,1B,86,D,BD,A3,
A,39,2751
78 DATA 35,10,A6,80,27,D,7D,1,1A
,27,3,BD,16,28,BD,A3,A,20,EF,6E,
84,ED,7E,27,2E,34,16,8E,16,AC,6F
,E2,2930
79 DATA 6F,E2,6F,E4,6C,E4,A3,84,
24,FA,E3,81,34,6,A6,62,4A,1F,89,
EA,63,E7,63,27,4,8B,30,8D,1B,35,
6,6D,3742
80 DATA 1,26,DF,32,62,35,96,86,3
0,8D,D,39,27,10,3,E8,0,64,0,A,0,
1,0,0,BD,A3,A,39,BD,A9,28,BD,241
3
81 DATA 16,60,4E,6F,74,20,61,20,
44,69,73,6B,20,53,79,73,74,65,6D
,D,48,69,74,20,61,6E,79,20,6B,65
,79,20,2715
82 DATA 0,BD,A1,B1,F,71,7F,FF,DE
,6E,9F,FF,FE,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,20,20,2101
83 DATA 20,D,46,69,6C,65,20,4E,6
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```
1,6D,65,3A,20,0,46,69,6C,65,20,6
E,6F,74,20,66,6F,75,6E,64,0,D,42
,75,2457
84 DATA 66,66,65,72,20,46,75,6C,
6C,0,49,2F,4F,20,45,72,72,6F,72,
0,44,69,73,6B,20,69,73,20,77,72,
69,74,2740
85 DATA 65,20,70,72,6F,74,65,63,
74,65,64,0,44,69,73,6B,20,69,73,
20,66,75,6C,6C,0,0,0,0,0,0,0,0,2
217
86 DATA 0,0,0,0,0,FF,0,20,20,20,
20,20,20,20,20,20,20,20,0,20,20,
20,20,20,20,20,20,20,20,20,17,8C
,1122
87 DATA 0,0,0,0,0,0,0,0,0,0,0,0,
20,20,20,20,20,20,20,20,20,4F,52
,43,48,2D,39,30,2F,43,43,28,959
88 DATA 74,6D,29,D,20,20,20,20,4
6,69,6C,65,20,43,6F,6E,76,65,72,
73,69,6F,6E,20,55,74,69,6C,69,74
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89 DATA 43,6F,70,79,72,69,67,68,
74,20,28,63,29,20,31,39,38,35,20
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2,64,D,2528
90 DATA 20,20,20,54,4D,20,6F,66,
20,53,6F,66,74,77,61,72,65,20,41
,66,66,61,69,72,2C,20,4C,54,44,2
E,D,D,2370
91 DATA 0,BD,A9,28,BD,16,60,50,6
5,72,66,6F,72,6D,69,6E,67,20,6D,
65,6D,6F,72,79,20,73,65,6E,73,65
,2E,D,3084
92 DATA 4F,6E,65,20,6D,6F,6D,65,
6E,74,2C,20,70,6C,65,61,73,65,2E
,2E,2E,0,1A,50,8E,3F,0,A6,84,43,
A7,84,2801
93 DATA A0,84,63,80,4D,27,F4,30,
1E,8C,7F,FF,23,3,8E,7F,FF,BF,17,
88,1F,10,5F,1F,1,BF,16,F1,30,89,
F7,0,3451
94 DATA BF,16,EF,30,89,FF,0,BF,1
6,ED,F,71,39,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,1527
95 DATA "X"
```

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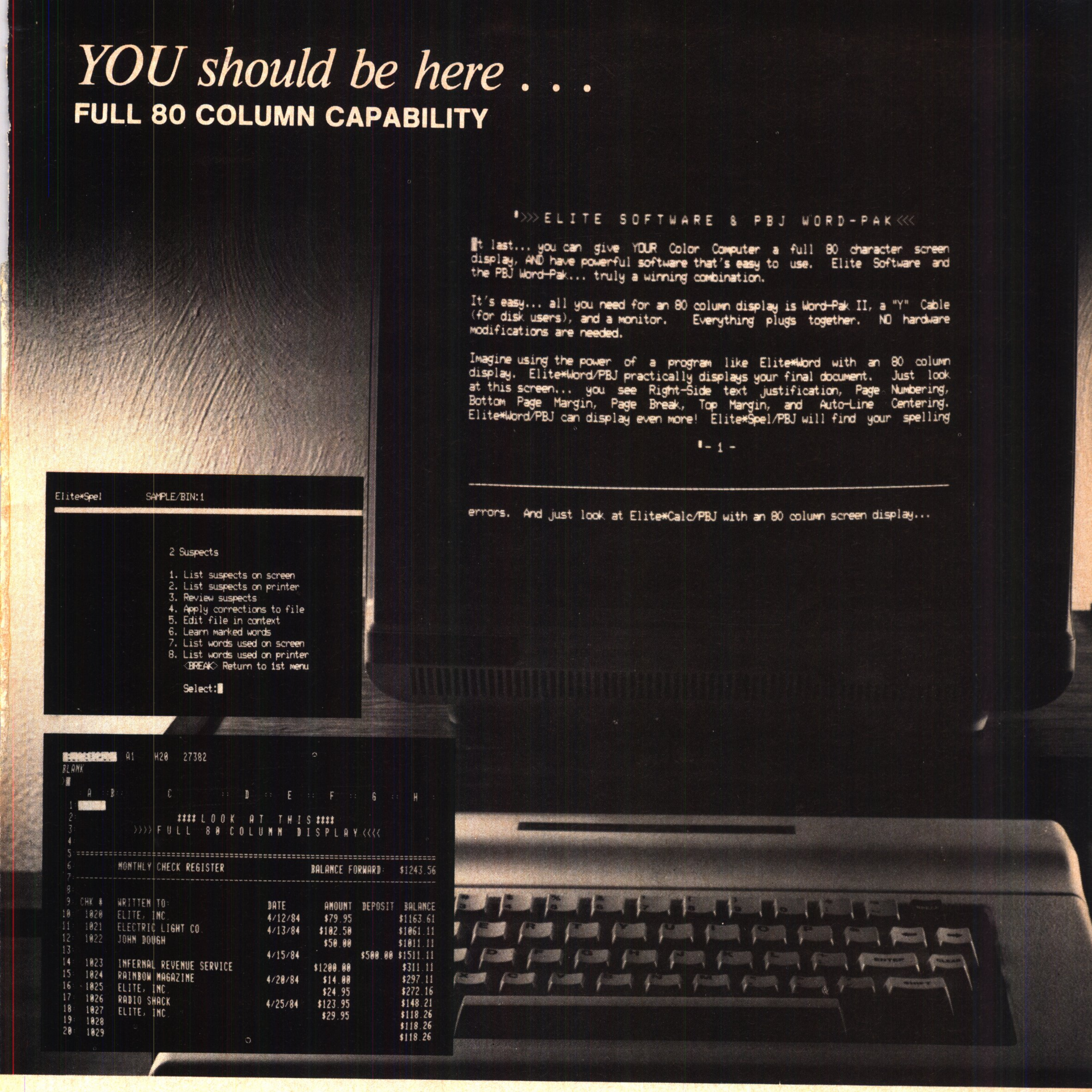

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                                 - 1 -

______________________________________________________________________________

errors.  And just look at Elite*Calc/PBJ with an 80 column screen display...
```

```
Elite*Spel         SAMPLE/BIN:1

                          2 Suspects

                          1. List suspects on screen
                          2. List suspects on printer
                          3. Review suspects
                          4. Apply corrections to file
                          5. Edit file in context
                          6. Learn marked words
                          7. List words used on screen
                          8. List words used on printer
                            <BREAK> Return to 1st menu

                            Select:
```

```
[illegible]  A1   H20   27382
BLANK
>
    A  B        C         D      E      F      G      H
 1
 2              ####LOOK AT THIS####
 3          >>>>FULL 80 COLUMN DISPLAY<<<<
 4
 5 ==========================================================================
 6      MONTHLY CHECK REGISTER                      BALANCE FORWARD:  $1243.56
 7 --------------------------------------------------------------------------
 8
 9  CHK #  WRITTEN TO:                       DATE     AMOUNT  DEPOSIT  BALANCE
10  1020   ELITE, INC.                      4/12/84   $79.95          $1163.61
11  1021   ELECTRIC LIGHT CO.               4/13/84  $102.50          $1061.11
12  1022   JOHN DOUGH                                 $50.00          $1011.11
13                                          4/15/84          $500.00  $1511.11
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19  1028                                                               $118.26
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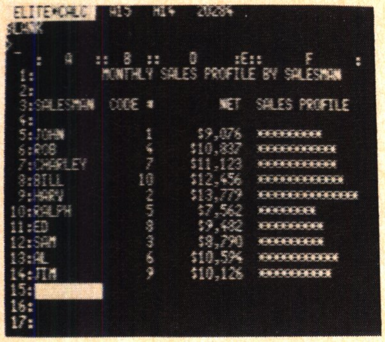
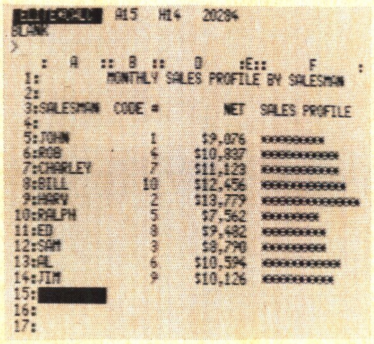
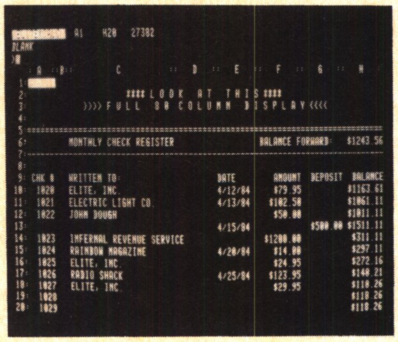


```
ELITE•CALC  A15  H14  20284
BLANK
>
  :  A  :: B ::   D   :E::    F     :
 1:          MONTHLY SALES PROFILE BY SALESMAN
 2:
 3:SALESMAN  CODE #        NET  SALES PROFILE
 4:
 5:JOHN         1      $9,076  ***********
 6:ROB          4     $10,837  *************
 7:CHARLEY      7     $11,123  *************
 8:BILL        10     $12,456  **************
 9:HARV         2     $13,779  ****************
10:RALPH        5      $7,562  **********
11:ED           8      $9,482  ***********
12:SAM          3      $8,790  ***********
13:AL           6     $10,594  *************
14:JIM          9     $10,126  ************
15:
16:
17:
```



```
            A15  H14  20284
BLANK
>
  :  A  :: B ::   D   :E::    F     :
 1:          MONTHLY SALES PROFILE BY SALESMAN
 2:
 3:SALESMAN  CODE #        NET  SALES PROFILE
 4:
 5:JOHN         1      $9,076  ***********
 6:ROB          4     $10,837  *************
 7:CHARLEY      7     $11,123  *************
 8:BILL        10     $12,456  **************
 9:HARV         2     $13,779  ****************
10:RALPH        5      $7,562  **********
11:ED           8      $9,482  ***********
12:SAM          3      $8,790  ***********
13:AL           6     $10,594  *************
14:JIM          9     $10,126  ************
15:
16:
17:
```

Elite•Calc/3.0 offers TWO 51 character displays



```
            A1    H20   27382
BLANK
>
  : A :B:          C          :: D :: E :: F :: G :: H :
 1:
 2:                   #### L O O K   A T   T H I S ####
 3:             >>>> F U L L   8 0   C O L U M N   D I S P L A Y <<<<
 4:
 5:==========================================================================
 6:          MONTHLY CHECK REGISTER                BALANCE FORWARD:   $1243.56
 7:--------------------------------------------------------------------------
 8:
 9: CHK #    WRITTEN TO:                  DATE       AMOUNT  DEPOSIT  BALANCE
10:  1020    ELITE, INC.                  4/12/84    $79.95            $1163.61
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15:  1024    RAINBOW MAGAZINE             4/20/84    $14.00             $297.11
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17:  1026    RADIO SHACK                  4/25/84   $123.95             $148.21
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VISA

How Valuable Is The 'Hands-On' Lesson?

By Michael Plog, Ph.D.
Rainbow Contributing Editor

When I was in high school, one project in biology class was the dissection of a frog. One girl in our class lived on a farm with a pond, and provided a host of frogs for the class. We were given little knives (scalpels), a tray half-filled with wax and other dissection equipment. We then cut the frogs apart to discover some of the mysteries of anatomical organization of living beings. This is still an exercise associated with science education.

Our teacher was a somewhat nervous and eccentric person, fighting an uphill battle trying to get her students to appreciate the workings of a biological mechanism. After I became an adult, I realized that most science laboratory teachers are somewhat nervous, and the best ones are probably a little eccentric. Every year, a student will cut a finger with a scalpel; another will faint at the realization of the mess and gore of the biological mechanism; and instead of using a straight pin to keep parts of the frog out of the way of the work area, a student will use it to draw human blood! (It is no wonder science teachers are a little nervous when turning a group of students loose with these dangerous "weapons.")

I have even more sympathy for my biology teacher, because she was also the chemistry teacher. After mixing several concoctions with difficult names, including hydrogen sulfide (smells like rotten eggs), we made gun powder. After mixing small batches of the stuff, we went outside and got to see whose batch would explode and whose batch was improperly made.

There is no doubt about it — science laboratories can be dangerous places. Acids which burn skin and clothes have to be used in chemistry classes; scalpels have to be used in biology classes. Or do they?

Imagine, if you will, the dissection of a frog without touching it — without touching a scalpel or a pin or even a wax tray. Imagine mixing volatile chemical solutions and testing for an explosion, with no fear that some student will be careless and get injured.

Such lessons are being planned right now. The frog will get dissected and the mixture will explode, but no student will get hurt. In fact, no student will be at a bench in a laboratory. The students will control the laboratory experience through a computer and video program.

The technology for this class is called computer-interactive videodiscs. That technology has been around for about 20 years, but has not been applied to middle and high school science laboratories before. The videodisc is to be connected to a computer as sort of a combination disk drive and screen controller. Students, based on keyboard entry, control which area of the videodisc is accessed and in what sequence. Thus, students can "control" the dissection of a frog by using a keyboard instead of a scalpel. All internal organs can be examined and "removed," then examined again. Students can "back up" and review the entire dissection or just one part.

A videotape would be inappropriate for this application. The videodisc is more like a "random access file," where students can skip around to different places on the disc with very little trouble. The videotape is like a "sequential access file," which has to be accessed from the beginning completely through to the end.

The amazing thing about this type of classroom use of the computer is that it is not futuristic at all. At RAINBOWfests, you can see the Color Computer connected to all sorts of video equipment. The interaction

---

(Michael Plog received his Ph.D. degree from the University of Illinois. He has taught social studies in high school, worked in a central office of a school district, and currently is employed at the Illinois State Board of Education.)

process between a videodisc and computer is certainly beyond my capabilities, but not to some of the hardware buffs who have helped enhance the Color Computer with all sorts of inventions.

The current push to implement this technology in schools is coming from the National School Board Association (NSBA). That group is promoting a $15 million public school project (called "Sci-Lab") to teach biology, physics and chemistry experiments on computer. NSBA hopes to produce 20 lessons in each of the three sciences — enough for a year in each subject. A Sci-Lab would look like a laboratory, but have work stations instead of benches. Students would face a screen and keyboard to conduct the experiment.

The price of Sci-Lab will be about the same as a new laboratory: around $100,000 for 25 work stations. A school, however, would have three laboratories in one, since each work station could conduct experiments in biology, chemistry and physics. It might even be possible to buy just a few stations or have the Sci-Lab mobile, so several districts could benefit from the same equipment.

There are, I am told, a few problems to this particular application of technology to education. (Well, there are problems to *everything*.) In the first place, the production of videodiscs is more expensive (and more complicated) than production of a videotape. Thus, you will probably not see individual school districts producing lessons on videodiscs. Instead, the lessons will be provided from NSBA itself, relying on specialized talent. After the lessons are produced, they would be given away or licensed to a marketer (depending on who financed the project).

The questions that should be asked about the techology, however, relate more to whether or not students will learn more about the subject matter from this approach or the more traditional approach. There are some positive features of this simulation approach. Students can repeat each lesson as many times as they (or their teachers) want. This may indeed help students to enhance their level of science knowledge.

NSBA representatives have also talked about a system which will allow teachers to monitor student progress and will even test students and grade exams. That would certainly free the teacher for more time for individual help to students.

What about the negative aspects of this idea? Might students learn more about controlling a keyboard than the digestive system of a frog? There is a folk wisdom used a lot by teachers that students "learn by doing." This implies an active approach to education on the part of the student.

The computer-integrated videodisc is more passive than a literal "hands-on" lesson, but more active than watching a film about a dissection. Also, if students do learn by doing, what do we want students to learn from an exercise in dissection? Not only are students supposed to learn about the insides of an animal, but are supposed to learn about processes of science as well.

Laboratory teachers have many objectives for an exercise such as dissection. Students are expected to learn about (by doing) the procedures used in a science lab. They are supposed to learn techniques that will help in more advanced scientific work. The "feel" of a scalpel through dead tissue is a skill that advanced students should have before attempting an examination of the nervous system of a mammal. That skill cannot be learned from a videodisc.

I must confess ignorance and confusion about this application of technology to education. In the first place, while it seems probable that students will learn more about the specific scientific experiment (dissection, chemical reactions, etc.) by the ability to repeat the lesson, there is no hard evidence that such additional learning will take place. There is also no hard evidence that the lack of a hands-on approach will damage students' skills or learning.

There is no guarantee that NSBA's project will ever be successful. The entire program may die from something as simple as lack of funding or something as complicated as the inability of a television screen to adequately differentiate between a nerve and a blood vessel. If successful, this application of technology to education could open entire new fields for schools as well as home education.

If you have any thoughts on this innovative use of computers in schools, I would like to hear from you. My address is 829 Evergreen, Chatham, IL 62629. We are without question living under the ancient Chinese curse: "May you live in interesting times!"

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This time, a salute to the National League teams . . .

Return Of Baseball Fever

By Fred B. Scerbo
Rainbow Contributing Editor

Editor's Note: If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. *Remember, keep your ideas specific, and don't forget that this is* BASIC. *All programs resulting from your wishes are for your use but remain the property of the author.*

Here we are in our September issue which should be in your hands sometime in the month of August. The sun is out, the temperatures are high and we are still in the midst of the season for America's most popular spectator sport: baseball.

Since more than half of my mail during the last year has asked for part two of last year's highly popular *Baseball Fever1* (June 1984, Page 90), which depicted the graphics logo of each of the American League teams, this month you will find *Baseball Fever2*, or *Fever2*, if you like, which will repeat the same function as *Part I*, only using the National League teams.

Fever2 is written entirely in Extended Color BASIC and the program requires either 32K or 64K. Fear not, however, as I will show all of you 16K owners how to use the logo of your choice in 16K ECB. You will notice that I have incorporated many of the techniques which went into *Football Fever Parts 1* and *2* (November 1984, Page 177 and December 1984, Page 107), as well as some of the extra `PMODE` colors introduced in previous "Wishing Well" articles.

To make it easy for those of you with 16K, I have included separate `DIM` statements in each logo that use these extra colors. Therefore, anyone who wants to type in an individual logo will have to add four lines, at best, to make the routines run effectively. In previous listings, you often had to add all the starting routines to generate the extra colors. Since I am only using two of these extra colors, yellow and brown, it was easy to include the routines only when needed. I have also made the arrays smaller to make them paint these colors much more quickly.

Enough talk. Let's get down to business.

(Fred Scerbo is a special needs instructor for the North Adams Public Schools. He holds a master's in education and published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.)

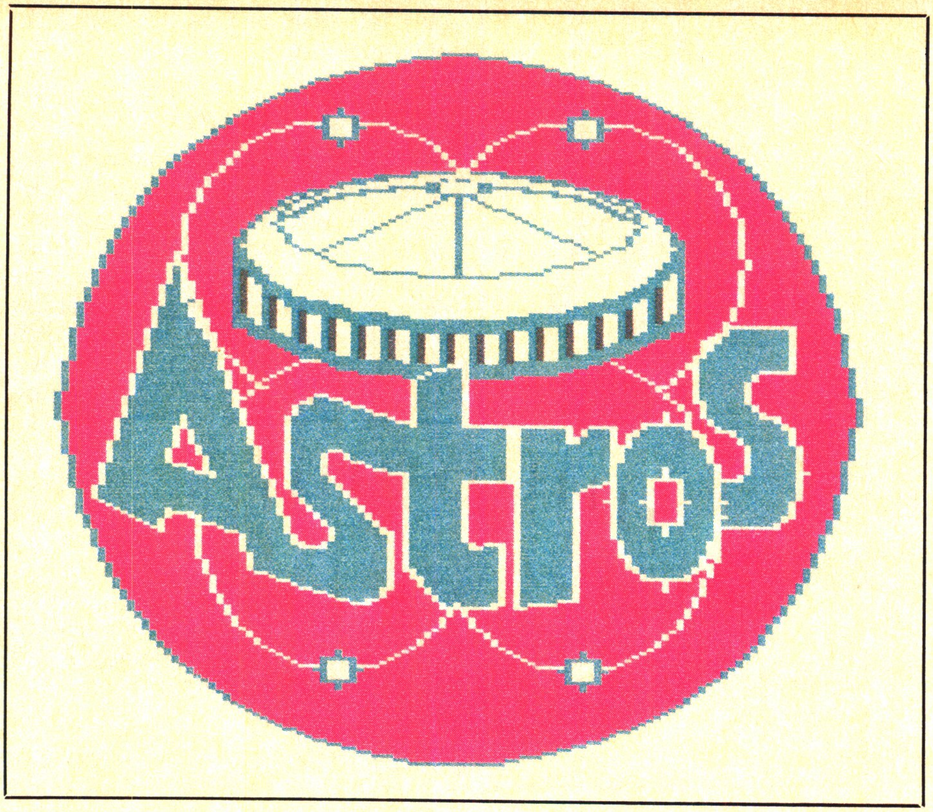
The Wish

Some of this is old territory, so I will be brief. I have always stated in the "Well" that the best way to learn graphics is to type in someone else's graphics routines. I am all for the "CoCo Gallery," but I do not like seeing everyone using the various graphics programs. Don't any of you believe in using the graphics language that comes in your CoCo? Aren't there any purists left out there? I challenge you folks to start submitting some Extended BASIC winners. I know you can do it.

Anyway, *Fever2* is designed to encourage those of you who want to learn how to create your own graphics as part of a BASIC program. Many of you have submitted this wish. Before we finish, I'll give you all some hints on how to draw these graphics on your own from your own original ideas.

The Program

Like *Fever1*, this program will, upon being `RUN`, display a title card which has a crisscrossed printing of "BASE" and "BALL" with "FEVER 85" down



in the corner. Both the letters 'A' and 'B' in baseball will be either red or blue. To get to the menu, press whichever letter, the 'A' or 'B,' is red. This will assure the correct color set which usually occurs at random. It is a much easier method to use than constantly pressing the Reset button. Those of you who have 16K will have to use the old reset method, however.

The 12 teams will be listed on your menu. By pressing the letter next to the team you wish to display, the screen will create the graphics before your eyes. You can easily restart the program by pressing ENTER. The reasons I have chosen this method rather than simply returning to the menu are two-fold.

First, the original *Fever1* was too large to fit in 32K with the disk controller in place. The variables used were too many, and we would fall just a few bytes short on the memory scale. Rerunning the program let the program work without getting an ?OM Error. From what I can tell, the way BASIC uses pointers with GOSUBs, the accumulation of pointers caused the ?OM Error. A fresh RUN cleared all these pointers. Even though *Fever2* is not as large and does not require the extra bytes, I thought I should keep the two programs the same.

Secondly, using this method makes it easier to take parts out and use them in 16K. Since the routines are not called by GOSUB, you will not get an ?RG Error (return without gosub) if you use only parts of the program. Everything just flows forward in the program.

For 16K Users

If you wish to type in just one graphics, go to the listing and type in the lines between the REM statements showing the start of that team and the next team's beginning. After you have done this, include the following lines:

```
10 PMODE4,1:PCLS1:SCREEN1,1
20 PMODE3:PCLS2
30 IFINKEY$<>CHR$(13)THEN30
40 R=2:R$="C2":B=3:B$="C3"
```

Upon running your short listing, if the screen is red, press ENTER. If it is blue, press Reset and RUN again until the screen comes up red. That's all it takes.

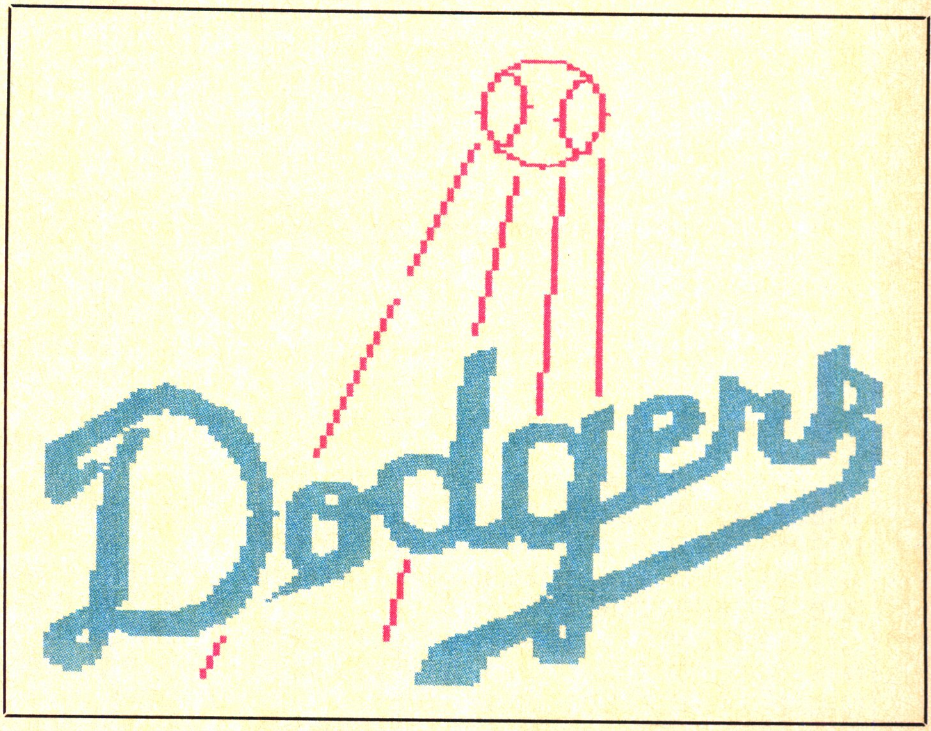
A Few Secrets

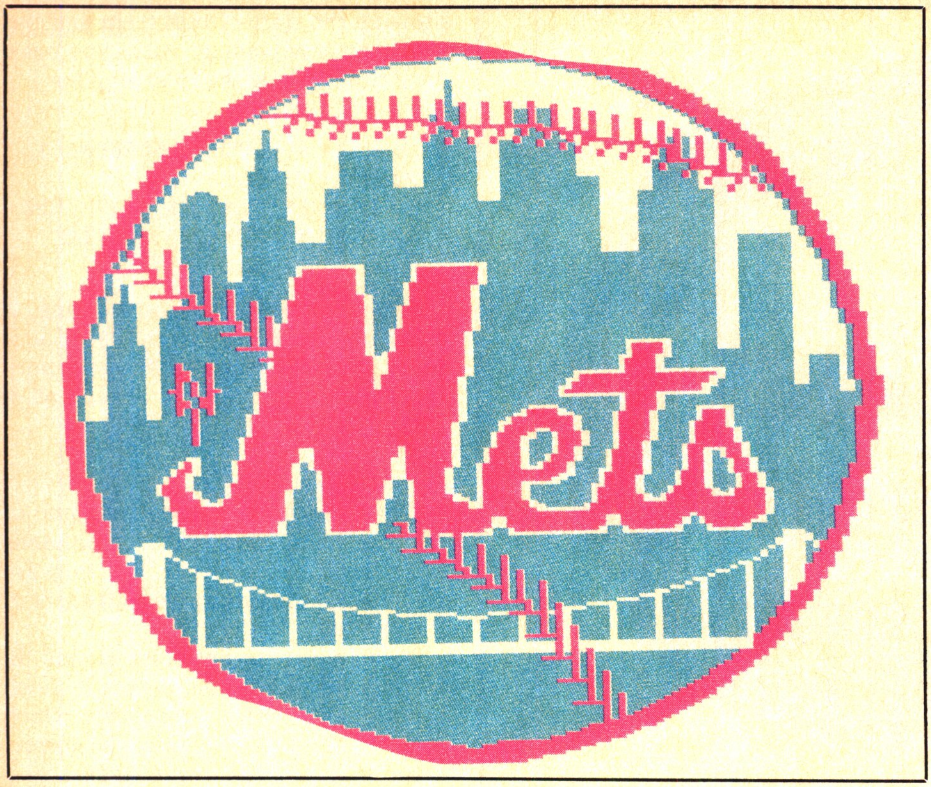
I have probably mentioned some of these techniques in previous columns or at the RAINBOWfest, but they are worth repeating for any new readers of the "Well".

I always use the variables 'R' and 'B' for red and blue. This makes it much easier than trying to remember which number, '2' or '3,' generates the correct color under a given circumstance.

I also use R$ for the color value of red in a DRAW statement, and B$ for the value of blue. Thus, when I want to draw a specific color, I DRAW R$+" . . . " whatever string of information I need to create my graphics. Believe me, this saves a great deal of work.

Also, many of you have written and asked whether or not I use graph paper when I create these designs. The answer is: No, I do not use graph paper. I





actually create the graphics as I go along. This is not as difficult as you may think it is. If you remember that your screen is 256 by 192, it is easy to remember that dead center is roughly 128 by 96. I will start a `CIRCLE` or `DRAW` statement at X,Y coordinates based on this relationship.

When I create, I make each logo an individual program and merge them together at the end. I use the lines I showed you for crushing this program into 16K, then add on this line at the end of the list:

```
1000 IFINKEY$=""THEN1000ELSE
     CLS:LIST-999
```

This line will hold the graphics screen in place until a key is pressed, at which point the screen lists the program up to the point where I last left off. Since I use a full-screen editor program, I can easily move the cursor to the last line I worked on and add any `DRAW` directions or change an X,Y coordinate as needed.

If you don't use a full-screen editor, you can simply `EDIT` the last line used. You can even add the `EDIT` command to the end of the `IF/THEN` statement, but you will have to change the line number each time you want to start a new line.

Using this technique, I can adjust my graphics as I create it. Try this method; I think you will find it greatly speeds up your graphics programming.

Conclusion

I hope you are now all satisfied that *Fever2* has seen the ink of these pages. It took a great deal of time to create, so it may be some time before we see the NBL logo program many of you have also asked for. Be patient. Like all good things, you will find it is worth the wait.

26	70	720	101
66	247	732	186
116	123	820	51
204	34	910	3
308	203	1004	111
318	196	1016	195
410	54	1104	204
518	175	1116	10
530	13	1200	68
614	174	1216	168
704	12	END	222

The listing: `BASEBLL2`

```
2 '*****************************
4 '* BASEBALL FEVER '85 PT. 2*
6 '*BY FRED B.SCERBO (C)1985 *
8 '*****************************
10 PMODE4,1:PCLS1:SCREEN1,1:PMOD
E3
12 FORI=20TO24:I$=STR$(I):DRAW"S
16BM"+I$+",102C3U12R6F2D2G2NL6F2
D2G2NL6BR8C2M+6,-12M+3,+6NL6M+3,
+6BR8C1NH2R4E2U2H2L4H2U2E2R4NF2B
R10NR6D6NR6D6NR6":NEXT
14 FORI=84TO88:I$=STR$(I):DRAW"B
M"+I$+",48C3U12R6F2D2G2NL6F2D2G2
L6C1BD16D8NR8BD2D8R8":NEXT
16 DRAW"S4BE26BU28U6NR6U6R6BR8NR
6D6NR6D6R6BR6BR2BU12M+4,+12M+4,-
12BR6NR6D6NR6D6R6BR8U12R4F2D2G2N
L4F2D4":FORY=1TO4:FORI=150TO170S
TEP20:CIRCLE(180+Y,I),20,2,.6:NE
XTI,Y
18 DRAW"BM216,140C2R20DL20D20R2N
U20":FORY=1TO4:CIRCLE(220+Y,170)
,20,2,.6,.72,.3:NEXTY
20 CLEAR260
22 X$=INKEY$:IFX$="A"THEN24ELSEI
FX$="B"THEN26ELSE22
24 R=2:B=3:R$="C2":B$="C3":OF=0:
GOTO28
26 R=3:B=2:R$="C3":B$="C2":OF=-1
28 CLS:PRINT" ";STRING$(30,"*")
30 PRINT
32 PRINTTAB(5)"A) HOUSTON ASTROS
"
34 PRINTTAB(5)"B) MONTREAL EXPOS
"
36 PRINTTAB(5)"C) NEW YORK METS"
38 PRINTTAB(5)"D) PHILADELPHIA P
HILLIES"
40 PRINTTAB(5)"E) PITTSBURGH PIR
ATES"
42 PRINTTAB(5)"F) LOS ANGELES DO
```

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```
DGERS"
44 PRINTTAB(5)"G) CINCINNATI RED
S"
46 PRINTTAB(5)"H) CHICAGO CUBS"
48 PRINTTAB(5)"I) SAN FRANCISCO
GIANTS"
50 PRINTTAB(5)"J) SAN DIEGO PADR
ES"
52 PRINTTAB(5)"K) ST.LOUIS CARDI
NALS"
54 PRINTTAB(5)"L) ATLANTA BRAVES
"
56 PRINTTAB(5)""
58 PRINT" ";STRING$(30,"*");
60 FORI=1TO481STEP32:PRINT@I,"*"
;:PRINT@I+29,"*";:NEXT
62 X$=INKEY$:IFX$=""THEN62
64 X=ASC(X$)-64:IFX<=0THEN62ELSE
IFX>12THEN62
66 ON X GOTO100,200,300,400,500,
600,700,800,900,1000,1100,1200
98 'HOUSTON ASTROS
100 PMODE4,1:PCLS1:SCREEN1,1:PMO
DE3
102 CIRCLE(128,96),108,B,.9:CIRC
LE(128,52),60,B,.35:CIRCLE(128,6
6),64,B,.35,.05,.45:DRAWB$:DRAW"
BM68,50D24BR120U24"
```

```
104 CIRCLE(128,46),50,B,.3:CIRCL
E(128,36),10,B,.3:DRAW"BL60BU12N
D22BU2BL6L12DL8DL6DL4DL2DL2DL2DL
2DL2"
106 DRAW"BM128,36BR6R12DR8DR6DR4
DR2DR2DR2DR2DR2BM128,36BF2M+36,+
16BM128,36BG2M-36,+16"
108 FORI=1TO3:CIRCLE(128,66-I),6
4,B,.35,.05,.45:CIRCLE(128,52+I)
,60,B,.35,1,.5:NEXTI
110 POKE178,36:PAINT(74,64),,B:P
AINT(128,10),R,B
112 DRAW"C4BM52,54M-22,+66M+18,+
9M+2,-6M+20,+7M+3,+9M+27,+9R4ER2
ERU2RU6RU6LU3LH16U4E2R2F2M+12,+4
R4D26R2D2RD2F6R14UR2U16M-8,+1H2U
16R14D34M+16,-2U28E2M+6,-2"
114 CIRCLE(184,120),16,4,1.5:CIR
CLE(184,120),6,4,1.5:DRAW"BR20BF
12R10":CIRCLE(210,112),12,4,1.5,
.8,.23
116 DRAW"BU30H4U4E4R8U12L16G2L2G
2L2D4LD12RD4RF4R4DF4D6G2L4BL30U1
4L6G4L2U4L14D14L2U14L12U18M-14,+
6D12M-24,-8L2G2L2G2DG2D18F12D2G2
L6UL2M52,54BD44BR2M-4,+12M+12,+4
M-8,-14"
118 PAINT(52,58),B,4:PAINT(154,1
02),B,4:PAINT(184,104),B,4:PAINT
(210,112),B,4
120 CIRCLE(96,124),40,4,1.1,.1,.
5:CIRCLE(160,124),40,4,1.1,0,.4:
CIRCLE(96,124),40,4,1.1,.63,.73:
CIRCLE(160,124),40,4,1.1,.8,.9
122 CIRCLE(162,56),44,4,.9,.6,.1
8:CIRCLE(96,56),44,4,.9,.34,.92
124 CIRCLE(162,20),6,B,.9:PAINT(
162,20),4,B:CIRCLE(96,20),6,B,.9
:PAINT(96,20),4,B
126 CIRCLE(162,166),6,B,.9:PAINT
(162,166),4,B:CIRCLE(96,166),6,B
,.9:PAINT(96,166),4,B
128 IFINKEY$<>CHR$(13)THEN128ELS
ERUN
198 'MONTREAL EXPOS
200 PMODE4,1:PCLS1:SCREEN1,1:PMO
DE3
202 CIRCLE(34,110),30,R,.9,.6,.2
:CIRCLE(40,118),40,R,1,.27,.6:CI
RCLE(48,124),64,R,.55,1,.3:CIRCL
E(72,102),50,R,.8,.1,.35
204 CIRCLE(40,120),10,R,.8:PAINT
(36,92),R,R
206 DRAWB$+"BM62,98M+30,-80":CIR
CLE(122,20),32,B,.7,.5,1:DRAW"BR
62BD2M-39,+104":CIRCLE(186,20),3
2,B,.7,.5,1
208 DRAW"BR62M+39,-104":CIRCLE(2
08,118),46,B,.9,.7,.4:CIRCLE(148
```

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```
,128),36,B,.9,.1,.57:PAINT(186,6
),B,B
210 IFINKEY$<>CHR$(13)THEN210ELS
ERUN
298 'NEW YORK METS
300 PMODE4,1:PCLS1:SCREEN1,1:PMO
DE3
302 CIRCLE(128,96),108,R,.9:CIRC
LE(128,96),102,R,.9:PAINT(128,4)
,R,R
304 CIRCLE(128,96),102,B,.9:DRAW
B$+"BM30,100R4U20R2U10E2U4RD4F2D
10R2D20R6U26E4R2U26E4R2F4D20R6U1
6R2U12E2U4E2NU4F2D4F2D12R2D6R10U
14R4U10R12D10R10U12E2U4E4NU6F4D4
F2D16R8U16R4U8R10D8R4D10R6D20"
306 DRAW"R12U16R4U8R2U6R6D6R2D8R
4D42R8U30R12D40R6U8R6D10R6":PAIN
T(128,186),B,B
308 DRAW"BM56,110C4D4L2D4F4R4E2M
+20,-60R16M+4,+32M+10,-30U2R18M-
10,+60F2R2F2R2U10E2U2E2U2E2U2R2E
2R2E2R6F2R2F2D2F2D2G2D2G2D2L2DL2
DL8D4F2R2DR12E2U4R2U4R2M+4,-20L1
6U2R2U2R2U2R12U4R2U4R10D4L2D4R16
D2L2D2L2D2L12M-6,+26"
310 DRAW"F2R4E4M+6,-20R8D4M+10,+
20D4G2L2G2L10H4RG4L14H4RG4L24H4R
2G4L16H2UH2M-1,-18M-8,+22L12M-5,
-22LM-6,+22L26M-6,-12E8BR88U4RE2
R2F2D4G4L4U4BR48D10F2R4E2UM-4,-9
L2"
312 PAINT(68,128),R,4:CIRCLE(128
,122),90,4,.35,.07,.45:DRAW"BM12
8,160C4NR72NL72DNR70NL70DNR68NL6
8NU8R12NU10R12NU10R12NU12R12NU14
R12NU18R12NU22BR10BU12U18R2ND15R
2ND13F4
314 DRAW"BM128,160C4D2NU8L12NU10
L12NU10L12NU12L12NU14L12NU18L12N
U22BL10BU12U18L2ND15L2ND13G4":DR
AWR$+"BR18BU30U8NH6E6G2NU9D4M-8,
-13D13"
316 DRAW"BM86,20NL10NG4NU6R2DR4N
U6NG4R2DR4NU6NG4R6NU6NG4R6NU6NG4
R6NU6NG4R2DR4NU6NG4R2DR4NU6NG4R6
NU6NG4R6NU6NG4R6NU6NG4R2DR4NU6NG
4R2DR4NU6NG4R2DR2NU6NG4DR6NU6NG4
DR6NU6NG4R2DR4NU6NG4R2D2R2NU6NG4
D2R6NU6NG4D2R6NU6NG4D2R6NU6NG4F4
"
318 DRAW"BL170BD10F8NU10NL8R2D3R
4NU8NL8D2RD2R4NU8NL8R2D3R4NU8NL8
D2RD2R4NU8NL8R2D3R4NU8NL8D2RD2R4
NU8NL8R2D3R4NU8NL8D2RD2R4NU8NL8B
M+20,+40R2D3R4NU8NL8D2RD2R4NU8NL
8R2D3R4NU8NL8D2RD2R4NU8NL8R2D3R4
NU8NL8D2RD2R4NU8NL8R2D3R4NU8NL8"
320 DRAW"D6R4NU8NL8D6R4NU8NL8D6R
4NU8NL8D6R4NU8NL8D6R4NU8NL8D"
322 IFINKEY$<>CHR$(13)THEN322ELS
ERUN
398 'PHILADELPHIA PHILLIES
400 CLS0:PMODE4,1:PCLS1:SCREEN0,
1:PMODE3
402 DIMY(12):DRAW"BM0,1":FORY=1T
O2:FORI=1TO60:DRAWR$+"R3C1R":NEX
TI:DRAW"BM2,2":NEXTY:GET(0,1)-(2
40,2),Y,G
404 PMODE4,1:PCLS1:SCREEN1,1:PMO
DE3:CIRCLE(122,74),20,1,.9:CIRCL
E(122,62),70,1,.8,.52,.2
406 DRAW"BM54,58C1M-20,+126M+50,
-10E2UE2UE2UM+15,-80NU8":CIRCLE(
138,80),38,1,.9,.21,.46:CIRCLE(1
14,74),10,1,.9,.5,1:CIRCLE(130,7
4),10,1,.9,1,.5
408 PAINT(128,10),1,1:FORI=0TO19
1STEP2:PUT(0,I)-(240,I+1),Y,OR:N
EXT
410 IFINKEY$<>CHR$(13)THEN410ELS
ERUN
498 'PITTSBURGH PIRATES
500 CLS0:PMODE4,1:PCLS1:SCREEN0,
1:PMODE3
502 DIMY(40):DRAW"BM0,1":FORY=1T
O2:FORI=1TO60:DRAWR$+"R3C4R":NEX
```

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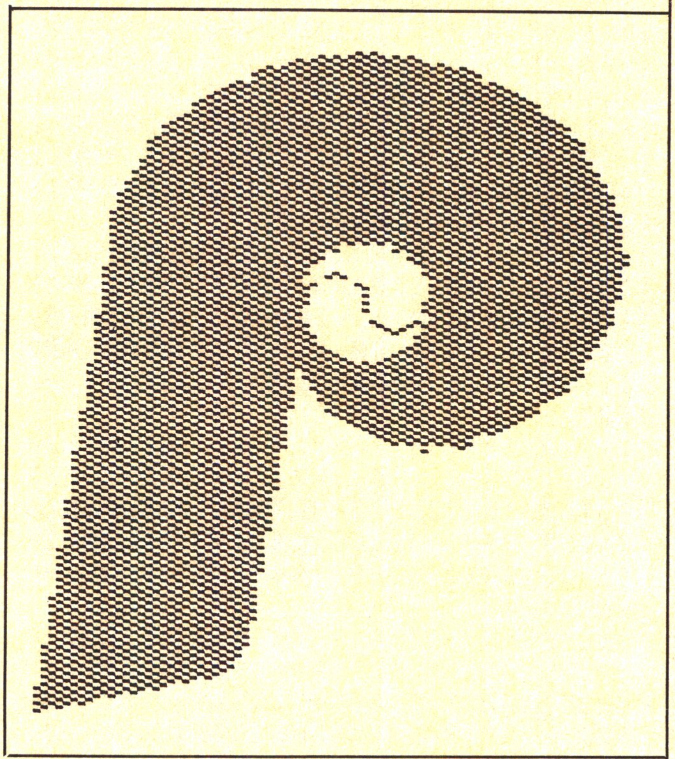
DEALER INQUIRIES INVITED!

```
TI:DRAW"BM2,2":NEXTY:GET(0,1)-(2
40,2),Y,G
504 PMODE4,1:PCLS1:SCREEN1,1:PMO
DE3:BX$="BM46,2C1R20F4E4R30F4E4R
22F4E4R30F2E2R26D10G4F4D36G4F4D3
6G2F2D32G3F3D22G4F4D12L20H2G2L26
H4G4L36H3G3L12H2G2L18H4G4L16U26E
4H4U32E2H2U16E4H4U22E2H2U12E3H3U
14E2H2U12E3H3U8"
506 DRAWBX$:PAINT(48,4),1,1:FORI
=1TO191STEP2:PUT(0,I)-(240,I+1),
Y,OR:NEXTI:DRAWBX$
508 GOSUB510:GOTO514
510 DRAW"BM110,140C1NU26E32R2F2R
2E2M+12,+18M+6,-36H4M-8,-3U3M+20
,-4M+4,-12U4":CIRCLE(124,77),60,
1,1,.7,.96
512 DRAW"BH36BL42G2DG2D16G4L2H2M
+2,-22U6H2L2M-22,+34D6F2DF2RF2RF
2M+12,+4R2D6M+8,+24D8F3R2F2R6":R
ETURN
514 PAINT(112,136),1,1
516 DRAW"C4BR34BU5U10E2U2H4U2M+6
,-14U2H2L2G2D4L2D6G2L4H2U4R2U10H
4L4H4L20DL4DL2G2DG8"
518 PAINT(112,136),4,4:GOSUB510:
DRAW"R10NE8DNL10DNL10RNE10F2M+14
,-10G2U6E2U2E2NR6BF2ND6BU4U4BU6N
U6BG20BL12ND4BU4L4UL2R8BU6R8ND2U
NH2L18NURD2"
520 DRAW"BU8BL4E4NF4URM+6,-18D2L
16UR10D2NR4NL6DNR4C4L4C1L3":CIRC
LE(100,70),9,1,.4:DRAW"D2R3NR2U2
D4G4":FORY=4TO9STEP5:CIRCLE(122,
70),Y,1,.4:NEXTY
522 DRAW"BF10R8E4NF4H2BU6NR10H2U
2E2UNL2R12L2UL10BU8C4BR18H4LG4L2
H4LG4L2H4LG4L2":FORY=1TO4:CIRCLE
(124,76+Y),57,4,1,.7,.96:NEXTY
524 DRAW"BR4BU12NG6U16L2D16G6NH4
NL6UL6H2U14RU16LD16L2D14BU30R3M-
18,+30LM+18,-30BR30BD30M+22,-10U
M-22,+10L3DR3D2RU2M+22,-10R4UL4U
NR4U3LD3"
526 DRAW"BD12D4L2U4L2ND4NR8UNR8N
H12DNH12DH12U6LD6LNU6L4UR4":CIRC
LE(130,39),7,4,1.2:PAINT(130,36)
,4,4:DRAW"C1BR5D3RU3BR3BDD3RNU3B
G2LDR"
528 DRAW"BM76,170C1U12R6D6NL6BR1
0U6D12BR8U12R6D6L6F6BR8M+4,-12M+
4,+12U4NL3D4BR10U12NL6R6BR8NR8D6
NR4D6R8BR8R8U6L8U6R8"
530 DRAW"BM52,8C1R2DL2BR138R2UL2
BD166R2UL2BL138R2DL2"
532 IFINKEY$<>CHR$(13)THEN532ELS
ERUN
598 'LOS ANGELES DODGERS
600 PMODE4,1:PCLS1:SCREEN1,1:PMO
DE3
602 CIRCLE(36,140),34,B,1.2,.7,.
2:CIRCLE(36,140),28,B,1.2,.7,.2
604 DRAWB$+"BM44,168G2L22E4U40E2
U2E2U2E2U2L4G2D2G2D2G2D2G2M-4,+4
0G2L2G2L2G2L2D2G2D2G2D2F2R2F2R4E
2R2E2U2E2U2E2U2R2DR2DR2DR21E2BL3
4L2G2L2D2F2R2E2U4"
606 DRAW"BU46BE4G10LGL2GL2H2L2H2
L2H2U12REREREREM+20,-12BD8M-20,+
12D4FR2E4F2":PAINT(42,174),B,B
608 DRAW"BF40BR12M+10,-8H2UH2U16
E2UE2RE2R10F2RF2E2R2E2U4ERE2RE2R
10F2RF2M+4,-34R2E2R2EM-6,+50D4F2
R2E2R2E2RU22E2UE2RE2R10F2RF2RU6R
2E2R2E2M-3,+32"
610 DRAW"E2R2E2R2E2U22E2UE2RE2R1
0F2D2F2D2G2DG2LG2LG2L2G2D4F2R2UR
2E2R2E2R2E2U2E2U2E2U16R4D2F2R2F2
R4E2R2F2D6L2D6F2R4E2U2E2U2E2U16E
2R2E2R2D6F2R2F2R2F2D6G2L2G2R2F2R
2D12G2D2G2D2M-110,+50G2L2G2D2G2D
2G2L16U2E2U2E2U2E2"
612 DRAW"M+124,-52U2E2U2E2U4H2BU
8E2U3H4LD10NR2BD8NE2G2D2G2L2G2L1
2H4U8E2U2L4H2L2D8G2D4G2D2G2M-22,
+11BU20U6E2R2UR2F2D2G2L2G2BD19G2
L2M-14,+7D8L2D10BD8D6L2D8G2L10H2
U8C4R6"
614 DRAWB$+"DU2D4R4U6BL8BU6E2U2E
2U2E2U2E2U4BU10U8R2U7H2U2H2L8G4D
18F2R8E2BD9L2G2L6H4LG4L10H2L2G2B
U6U10H2U2H4L4G2L2G2D12F2R2F2R6E2
BD6G2L8H2L2H2U2H2U6G2L2G2D12G2L2
G4L4DM-15,+5BE10BU4U12R2F2R6BU4U
```



```
2H2L2G2D2R6BD4D10L2G2L4H2"
616 PAINT(128,188),B,B:CIRCLE(15
0,16),20,R,.9:CIRCLE(126,14),20,
R,.9,.9,.15:CIRCLE(174,18),20,R,
.9,.4,.65
618 DRAWR$+"BM130,26M-20,+40BM-4
,+8M-24,+48BM-28,+56M-6,+12BM142
,38NU2M-12,+46BM-20,+70M-6,+24BM
156,36M-6,+72BM168,30D72"
620 IFINKEY$<>CHR$(13)THEN620ELS
ERUN
698 'CINCINNATI REDS
700 PMODE4,1:PCLS1:SCREEN1,1:PMO
DE3
702 CIRCLE(134,92),125,1,.6,.04,
.97:CIRCLE(134,92),70,1,.6,.05,.
95:DRAW"C1BM255,102ND4L52BU24NL2
R52BL238BU6":CIRCLE(134,92),125,
4,.6,.46,.55:DRAW"M-6,+12G10F10M
+5,+10"
704 GOSUB706:GOTO712
706 DRAW"BM74,151M+6,-22E2M+18,+
6F2D4G6L4F6D6L2HL2HL2H2U3H2LBU6U
EUEUE2RF2D3G3L3BD6LD2L2D3L4U2L4"
708 DRAW"BR30BD5M+3,-22R6DR6DR6D
6L6UL6D4R6DR4D4L6UL4D2LD3R4DR6D4
L6UL6UL6BR26D2M+2,-22R6UR6UR6F2R
F2D8R2D8G2L4DL6DL8NL6BU5U5R2U6E2
R4F2D9G2L6"
710 DRAW"BR24BU4E2R2F2R2E2U2H2L6
H4U5E2R2E2R2E2R4F4D2G2L2UH2L2G4D
F2R4E2R2F4D6G4L2G2L6H4U":RETURN
712 PAINT(128,30),R,1:PAINT(88,1
40),R,1:PAINT(144,144),R,1:DRAW"
C4":GOSUB706
714 DRAW"BU122BL2D14L2U14BL6L10D
R10L4D13L2U14BL12M+4,+14L2M-4,-1
4L2M-4,+14L2M+2,-7NR8M+2,-7BL14B
DM+4,+14L2M-4,-14M+4,+14NH12L2H1
2M+5,+14L2M-5,-14BL6BD3M+4,+14L2
M-4,-14M+4,+14NH12L2H12M+6,+14L2
M-6,-14"
716 DRAW"BG2BL3M+7,+14L2M-7,-14B
L2BG4L2G4D2M+6,+8F2R4E4U2G5L2HM-
6,-8U2E4R2BD8BL14F12L2NH12M-18,-
6L2M+18,+6LM-18,-6NF12LNF12BG4NF
12DLNF12LNF12BG2BD3L2G4D2M+6,+8F
2R4E4U2G5L2HM-6,-8U2E4R2"
718 CIRCLE(188,60),30,1,.9:PAINT
(188,60),1,1:PAINT(180,66),1,1:C
IRCLE(188,60),30,4,.9:PAINT(188,
40),4,4:CIRCLE(188,60),30,1,.9,.
96,.65:CIRCLE(162,64),22,R,.9,.8
,.18
720 DRAW"C1BM170,42R6DR6DR10M+20
,+8R14M-18,-10M-16,+3M+16,-3U6H2
UH2UH2LH2L18G2LG10D4R2UE16ERFND2
0FC4F2RF2R6F2L2U2R2D4C1L2GDFR6"
722 PAINT(194,40),R,1:PAINT(182,
40),R,1:PAINT(198,30),R,1:PAINT(
210,48),R,1
724 DRAW"BD16BL10E2R4F2L2NUBD4ND
2L2ND2R2UHL4G2DBR10BD2D2F2R6U2H4
U2E2R2BD2D2LBD6D4L6UL6UL4NUD3R4D
R6DR2NU2G4L2H4U2R2D2R2D2R2U3"
726 DRAW"BL42M-16,-6NL2G16L4NE16
U4L12M-3,+10L8H2UH2U4R4ND2U4R6NF
4UM+20,-10R8F2":PAINT(120,72),R,
1
728 DRAW"BD16BL8F4DG8F4R4UR4UR4U
R4UR4UR4NE6UR4UR6U2H4GF4R14BU2NH
6NE2BD2F2DF2DU9BR12D4RD6NL14D3NL
14L2M+4,+12NLF4D4G2L8U6DL4M-4,-1
2L2U4":PAINT(186,102),R,1:PAINT(
198,118),4,1
730 DRAW"NU4D4G8L2R4E2R6DF2D2M-1
4,+7L2D4L10H2U6M+12,-6":PAINT(17
6,118),1,1:DRAW"U4L8G6NF6":PAINT
(166,112),R,1
732 DRAW"L2NU8L4DL10UL8H2L2H2L2H
2U2H2U2E2U2E2R6BD14G6L2G2L2G2L2G
2L10UL10U8RU4RU2R2UR12NG6R4UR4UR
2BL20BD2U6H2UH2UH4L2G8M+12,+22M-
12,-22D2G8L2H2U2H2U4E2U2E2R2E2R2
U4R12D4"
734 PAINT(90,102),R,1:PAINT(72,1
00),1,1
736 IFINKEY$<>CHR$(13)THEN736ELS
```

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- 1 8-BIT I/O SPARE PORT
- DMA OPERATION WITH COCO BUS
- COPROCESSING MODE
- MC68008 ONLY MODE

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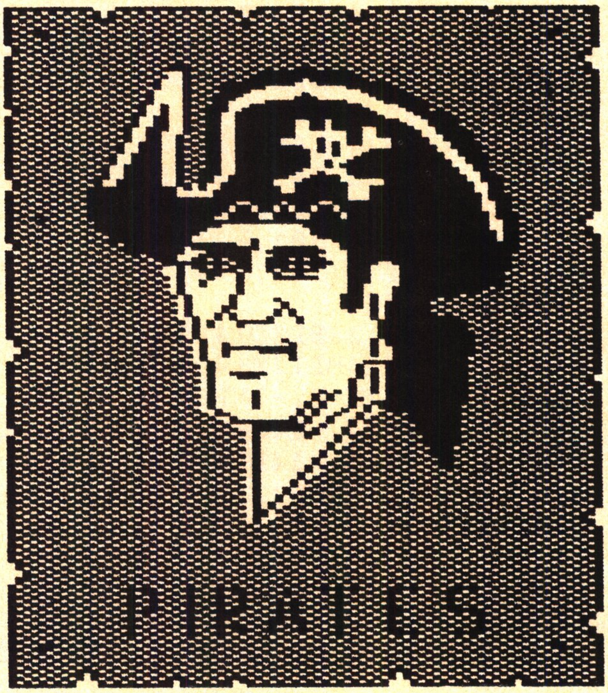
```
ERUN
798 'CHICAGO CUBS
800 PMODE4,1:PCLS1:SCREEN1,1
802 CIRCLE(128,106),94,0,.9
804 CIRCLE(128,106),74,0,.9:PAIN
T(128,30),0,0:PMODE3:PAINT(128,3
0),B,4:PMODE4
806 FORI=38TO60STEP22
808 CIRCLE(128,106),I,0,.9,.12,.
9
810 NEXTI
812 DRAW"C0BM158,126M+16,+14M-16
,-14BU40M+16,-14":PAINT(128,54),
0,0
814 DRAW"BM104,92D26F2R20E2U26L8
D20G2L4H2U20L8":PAINT(106,94),0,
0
816 DRAW"BR32D28R20E2U8H4E4U8H2L
20BF6BR2R4D6L4NU6BD4D6R4U6L4BD12
BR22":PAINT(140,94),0,0
818 DRAW"H2U6R8F2R4E2UH2L12H2U13
E2R20F2D6L8H2L4G2DF2R12F2D13G2L2
0":PAINT(170,94),0,0
820 PMODE3:PAINT(128,54),R,4:PAI
NT(106,94),R,4:PAINT(140,94),R,4
:PAINT(170,94),R,4
822 IFINKEY$<>CHR$(13)THEN822ELS
ERUN
898 'SAN FRANCISCO GIANTS
900 PMODE4,1:PCLS1:SCREEN1,1:PMO
DE3
902 CIRCLE(128,96),100,1,.9
904 CIRCLE(32,100),36,R,1.3,.1,.
8:DRAWR$+"BM62,126U34M-36,+12D12
M+20,-6D12G2DG2DL14H2UH2U2H2U6L2
U6L2U20R2U6E2R2E2R6F2D12M+27,-9U
32M-21,+7"
906 DRAW"BR22BD8D10R4UR4D44L4DL4
D10R4UR4UR4UR4UR6UR6UR8BU10L4DL4
U44R4UR4U9L8DL6DL6DL6DL4DL4BR36B
U6D10R4UR4M-10,+45BD9R10UR10U9L6
U4R2U4R2U2R10D2R2D4R2D4L6D8R8DR1
2BU10M-16,-44R6U10L12DL12DNL8"
908 DRAW"UR8BD14M-4,+20R10M-6,-2
0BU14BR20NR10D10R6ND40BU10R6DR6M
+12,+48U36L4U11R2DR8DR4DR8DR4DR4
DR2DR4DR2DR4DR2DR2D16L2UL2UL2U6L
2"
910 DRAW"UL2UL2D42R2DR4DR2D11L4U
L4UL4UL4UL4UL4U11R2DR2DR2U43L2UL
2UL2D8L2UL2NU9D45L6UL6UL2M-10,-3
2D22R2DR2D8L8UL4"
912 DRAW"BR60NU10R2D4R2D4R2D4R2D
2R2D2":CIRCLE(230,120),24,R,1.1,
.8,.41:DRAW"BU42BR20H10U6R2U4R2U
2R4U2R4D2F2D2F2D8R2DR2DR2DR4DR2U
26"
914 DRAW"L2U2L2U2L4UL4D4H4L2U2L4
U2L8D2L4D2L2D2L2D4L2D4L2D18R2D4R
2D2F18D2R2D4R2D4L2D4L2G2L2DL4UL2
UL2U2L2U3L2U10L4UL4UL4"
916 PAINT(32,58),1,R:PAINT(70,68
),1,R:PAINT(246,68),1,R
918 DRAW"BM76,34C1NU8NG6BR10BD4N
U8NG6BR10BD2NU8NG6BR12BD2NU8NG6B
R12BDNU8NG6BR12NU8NG6BR12BUNU8NG
6BR14BU2NU8NG6BR14BU3NU8NG6BR12B
U2NU8NG6"
920 DRAW"BM70,158NU8NF6BR12BU4NU
8NF6BRBR12BU3NU8NF6BR12BU2NU8NF6
BR12BUNU8NF6BR12NU8NF6BR12NU8NF6
BR12BDNU8NF6BR12BD2NU8NF6BR12BD3
NU8NF6BR10BD2NU7NF2"
922 IFINKEY$<>CHR$(13)THEN922ELS
ERUN
998 'SAN DIEGO PADRES
1000 CLS0:PMODE4,1:PCLS1:SCREEN0
,1:PMODE3
1002 DIMY(40):DRAW"BM0,1":FORY=1
TO2:FORI=1TO60:DRAWR$+"R3C4R":NE
XTI:DRAW"BM2,2":NEXTY:GET(0,1)-(
240,2),Y,G
```



```
1004 PCLS1:DIMZ(40):DRAW"BM0,1":
FORY=1TO2:FORI=1TO60:DRAWR$+"R2C
1R2":NEXTI:DRAW"BM2,2":NEXTY:GET
(0,1)-(240,2),Z,G
1006 PMODE4,1:PCLS1:SCREEN1,1:PM
ODE3:CIRCLE(128,96),90,1,.9:CIRC
LE(128,96),84,1,.9:PAINT(128,19)
,1,1
1008 FORI=1TO191STEP2:PUT(0,I)-(
240,I+1),Y,OR:NEXTI
1010 DRAW"C1BM34,118ND10L6D10L6N
```

```
U10BD6BR6M+12,+3D2M-6,+3NU5M-6,+
3BD6BR6M+12,-3M-8,+12M+12,-5BD20
BR12E10F6D4G6L4NH6BR14BD5M+4,-12
BR10BD3M+10,+2DM-10,-2M-2,+4M+6,
+1DM-6,-1M-2,+5M+10,+2BR12U10R10
BD6NL4D6NL10"
1012 DRAW"BR10U12R8D12NL8BR36BU6
H10E6F6G6F4BE6BR4M-3,-14E2M+8,+3
NG6M+6,+3BE2BR2H10E4R4F8D2G4BE10
M-12,-8E4R2F4D2NG2R6BE6BR2M+2,-6
M-2,+6M-6,-2M+2,-6M-2,+6M-8,-2M+
2,-6BE4BUNU10R6U10R6D10"
1014 CIRCLE(106,76),16,1,.9,.77,
.22:DRAW"C1BM106,88DL6DL4UL4UL4U
L2G2L4H2U2L4UL4UNL4M+4,-17":CIRC
LE(72,76),12,1,.9,.27,.74
1016 DRAW"D3R4D2F2R4E2NLNF2H2NGL
4UE2R4F2DNL2E6R2UR4F4D2G2DG2L4H2
BD8BL4ND2NUR6UR4UR4EUEUEUEUEUEUB
D4BR2D2LD2LD2"
1018 DRAW"BR14E8R2DR2D4RD2F2R2F2
R2M+20,+7R2DM-18,+9G2L2G2DL2DG2"
:CIRCLE(130,118),18,1,.9,.8,.3:D
RAW"BD30BL10L4M-40,-8H10R6M+26,-
10U4L4UL6UL6UL4G4L8H2UH2U6E6U4"
1020 PAINT(128,96),1,1:DRAW"BD44
BR8D8F2NR4DF10U6L2U4NL2D4R6NF4U4
NR4H4R10U4R10D8L4D2L4D2NH4G6L4NU
DL4D4F2R2NU6DF2R4NU4UR4NU4UR4E6L
12NG4NH4R12E2UE2UE2U2L2U4"
1022 DRAW"BU66BR16R18ND2R2D3M-16
,+5F6M+20,-8R8U3R2U3R2U3R2U4L2DL
2DL4H2UH2L4G2DG2DG2DG2BE10BR4M+5
0,-35R4DR4DR2DR2DG2DG2M-50,+29"
1024 PAINT(200,44),B,1:PAINT(200
,44),4,1:DRAW"BU4BM+40,-25G2LG2L
NUG2LG2LU2R2":CIRCLE(122,104),16
,4,.3,1,.5
1026 FORI=1TO191STEP2:PUT(0,I)-(
240,I+1),Z,OR:NEXTI
1028 IFINKEY$<>CHR$(13)THEN1028E
LSERUN
1098 'ST.LOUIS CARDINALS
1100 CLS0:PMODE4,1:PCLS1:SCREEN0
,1:PMODE3
1102 DIMY(40):DRAW"BM0,1":FORY=1
TO2:FORI=1TO60:DRAWR$+"R3C4R":NE
XTI:DRAW"BM2,2":NEXTY:GET(0,1)-(
240,2),Y,G
1104 PMODE4,1:PCLS1:SCREEN1,1:PM
ODE3
1106 DRAW"BM84,146C1M+90,-10F4R4
E2U4L2U4LU2H2L2G2D2M-90,+4G4D4F2
D2BE12BR18U4R2U4R2U4R2D4L2D4L2D4
BR32U6L2U4L2U4R2D4R2D4R2D4":PAIN
T(88,142),1,1
1108 FORI=120TO150STEP2:PUT(0,I)
-(240,I+1),Y,OR:NEXTI:CIRCLE(128
,96),110,R,.9:CIRCLE(128,96),84,
R,.9:PAINT(128,6),R,R
1110 DRAW"C1R2U4L2U4L2U4L6D4R2D4
R2D4L4D4R6M+8,+3R4E2UH2L4H2BL40U
6R2U4R6D4L2D4L2D4R4D4L4UL4DL4DL6
U4R6UR2U4BU8BR4L2U4L2U8":CIRCLE(
122,90),24,1,1.1,.2,.7
1112 DRAW"BU44BR4U4H4UE4U4L2U5E2
UE2UE2UE2R8DR4F2R2F2R2E8D10L2D6L
2D6M-8,+18D4R2D4R2D4R2D4M+4,+28M
+18,+10M+10,+16M+8,+4D3G4H30L10H
6L8DG4D2U6C4U36C1U2L2U4L2U4L2U4R
2F2R4E4H2L6G2H4UR14E4RD8M-14,+21
"
1114 PAINT(128,36),R,1:PAINT(128
,60),1,1:CIRCLE(128,62),4,4:DRAW
"BG10BL8BU2C1F6D2F2D6BR38BD6H20U
4BR4F4E4U2BD8NF6BU10BL8U6R2U4BU2
2L16E8NL10U2R4D2L4U2NH6R2NU10R4D
R6U4R2NU4L2D8L2D4NH10"
1116 DRAW"BM76,32C4E2R2E2R2E2H2U
H2G2L2G2L2G2H2UH2E2R2E2R2E2BR6BU
2M+12,-5BM-6,+3M+6,+10DBR8BU3R2U
L2BU2BR16NU12R8BR8M+3,-11R4DR6M-
3,+11L6UNL4DR6BR4BG2BR6M+7,-10M-
7,+10R2DR2DR2DR2M+7,-10BF2BR6M-8
,+10"
1118 DRAW"BF6BU3F2R2F2R2F2E2UE2H
2L2H2L2H2E2UE2F2R2F2R2F2"
```

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RAINBOWfest
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RAINBOWfest is the only computer show specifically dedicated to your Tandy Color Computer. Nowhere else will you see as many products, have immediate access to the top experts, or be able to attend free seminars of such import. It's the next best thing to receiving the latest issue of THE RAINBOW in your mailbox!

Every RAINBOWfest features many delightful surprises because it's a great opportunity for commercial programmers to show off many new and innovative products for the very first time. You get the jump on new capabilities for your CoCo. In exhibit after exhibit, there are demonstrations, opportunities to experiment with software and hardware, and special RAINBOWfest prices.

You can set your own pace between visiting exhibits and attending valuable, free seminars on all aspects of your CoCo — from improving BASIC skills to working with the sophisticated OS-9 operating system.

Many of the persons who write for THE RAINBOW — as well as those who are written about — are there to meet you and answer your questions, technical and otherwise. You also will meet lots of other persons, just like you, who share your interest in the Color Computer. It's a person-to-person event, as well as a tremendous learning experience, in a fun and relaxed atmosphere.

To make it easier for you to participate, we schedule RAINBOWfests in three parts of the country. If you missed the fun in Irvine, Calif. and Chicago, why don't you make plans now to join us in Princeton, N.J.? For members of the family who don't share your affinity for CoCo, you'll be comfortable knowing that RAINBOWfest is located in an area with many other attractions.

The Hyatt Regency - Princeton offers special rates ($65, single or double room) for RAINBOWfest. The show opens Friday evening with a 7 p.m. to 10 p.m. session. It's a daytime-only show Saturday — the CoCo Community Breakfast is at 8 a.m., then the exhibit hall opens promptly at 10 a.m. and runs continuously until 6 p.m. (There will be no exhibition hours or seminars Saturday evening.) On Sunday, the exhibit hall opens at 11 a.m. and closes at 4 p.m.

When you attend other computer trade shows, you are often disappointed. But you'll love RAINBOWfest because it is the only major show completely dedicated to the

Show Schedule:

Friday evening — Exhibits open from 7 p.m. to 10 p.m.

Saturday — CoCo Community Breakfast at 8 a.m.
Exhibits open at 10 a.m. and close at 6 p.m.

Sunday — Exhibits open from 11 a.m. to 4 p.m.

RAINBOWfest/PCMfest
Princeton, N.J.

Dates: October 11-13, 1985

Hotel: Hyatt Regency-Princeton

Rooms: $65 per night, single or double

Advance Ticket Deadline: October 4, 1985

FREE T-Shirt to first five ticket orders received from each state. FREE RAINBOW poster for first 500 ticket orders recieved.

Tandy Color Computer.

Tickets for RAINBOWfest may be obtained directly from THE RAINBOW. We'll also send you a special reservation form so you can get your special room rate.

Come to RAINBOWfest! Let's all celebrate the CoCo Community!

PCMfest Your admission to RAINBOWfest also entitles you to visit the premiere of PCMfest! It's a brand new show focusing on Tandy's new generation of computers — the Tandy MS-DOS computers and the Tandy Portables.

PCMfest is sponsored by our sister publication, PCM, *The Personal Computing Magazine for Tandy Computer Users.* The show will be in the same location as RAINBOWfest and the exhibit hours will be exactly the same. If you also use one of the newer Tandy computers, it's an opportunity you won't want to miss!

Keynote Speaker

Our guest speaker for the 8 a.m. CoCo Community Breakfast on Saturday is Bill Barden, one of the country's most widely read computer authors. In addition to hundreds of articles, Bill has written 30 books, including *TRS-80 Assembly Language Programming*, *Color Computer Assembly Language Programming* and *Color Computer Graphics*. Bill will discuss "Where We've Been, And Where We're Going." (Separate tickets are required.)

Free Seminars

Dennis Kitsz — **Your Own Color Computer Hardware**

Dennis Kitsz, RAINBOW's newest contributing editor, is a composer, veteran hardware and software designer and president of Green Mountain Micro. His new column in our RainbowTech section debuts in the October issue.

Paul Hoffman — **A CoCo Gallery**

Paul Hoffman is an independent designer/artist and Color Computer programmer. He is the author of *Master Artist* and other graphics programs from Owl-Ware.

Dale L. Puckett — **Beginners tour of OS-9**
also, Beginners tour of BASIC09

The author of *The Complete Rainbow Guide To OS-9* and *The Official BASIC09 Tour Guide* will discuss the advantages of the BASIC09 language, explain the available commands and demonstrate various functions. He also will give an overview of how to use the multitasking OS-9 operating system. Dale will be autographing copies of *The Complete Rainbow Guide To OS-9*.

Bill Barden — **Computer Languages**

As well as keynoting our CoCo Community Breakfast (Saturday at 8 a.m.), Bill will hold a seminar discussing the right language for your application. His overview will cover the most popular microcomputer languages, including BASIC, C, PASCAL and Assembly.

Dan Downard — **Q & A on Peripherals and Modifications**
also, Inside Your Color Computer

Dan Downard is the technical editor for THE RAINBOW and an electrical engineer. He has been involved in electronics for 25 years through ham radio (K4KWT). His interest in computers began about six years ago and he has built several 68XX systems.

- - - - - - - - - - - - - - - - - - - -

YES, I'm coming to Princeton! I want to save by buying tickets now at the special advance sale price. Breakfast tickets do require advance reservations.

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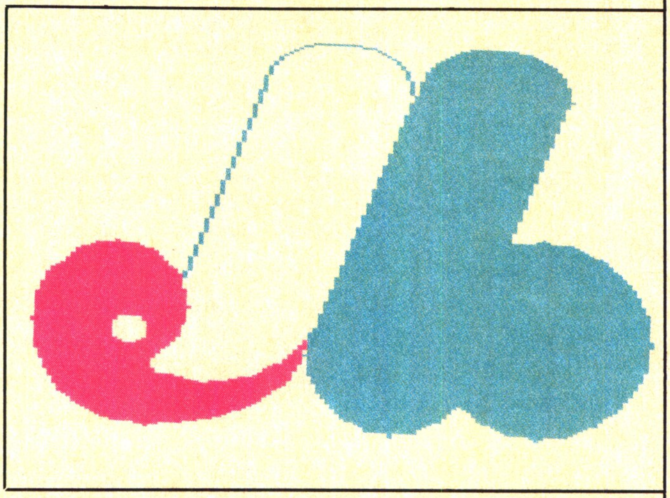
☐ VISA ☐ MasterCard ☐ American Express
Account Number ________________
Exp. Date ________________
Signature ________________

Make checks payable to: The RAINBOW. Mail to: RAINBOWfest, the Falsoft Building, P.O. Box 385, Prospect, KY 40059. To make reservations by phone, call: (502) 228-4492.

Advance ticket deadline: October 4, 1985. Orders received less than two weeks prior to show opening will be held for you at the door. Tickets will also be available at the door at a slightly higher price.

```
1120 DRAW"BM68,152H8G10F8BF6BR2M
+12,-8R2DF2M-3,+8NH6M-2,+4BR10BD
5M+5,-13R2DR2DR2DR2DR2D3L2D2L2D2
L2ND6UL2UL2UL2BM+20,+11U6R2U8R8D
R2F4D6L2D2G2L6UL4BR24NU14BR12M-2
,-14F12R2M-4,-14"
1122 DRAW"BF12M-2,-14E2RE2M+8,+5
L2G2L2G2NL2E2R2E2R2M+6,+4BE4BR2N
H10M+8,-6BE2BR2E10H6G10H4E10"
1124 DRAW"BM82,36C1F6NR6ND6F6NR6
ND6F6NR6ND6F6NR6ND6F2R2F2BR30BD1
4R2DR2NE4NF4R4DR4NE4NF4R4DR4NE4N
F4R6DR4NE4NF4R6DR4NE4NF4R8NE4NF4
R8NE4NF4R10"
1126 DRAW"BM56,130R4UR4NH4NG4R4U
R6NH4NG4R4UR6NH4NG4R4UR6NH4NG4R4
UR6NH4NG4R4UR6NH4NG4BR6R6DR2NU4N
G4R4F2R4NU4NG4F4BF8F6NU6NL4F6NU6
NL4F6NU6NL4F4"
1128 IFINKEY$<>CHR$(13)THEN1128E
LSERUN
1198 'ATLANTA BRAVES
1200 CLS0:PMODE4,1:PCLS1:SCREEN0
,1:PMODE3
1202 DIMY(40):DRAW"BM0,1":FORI=1
TO60:DRAWR$+"R3C4R":NEXTI:GET(0,
1)-(240,2),Y,G
1204 PMODE4,1:PCLS1:SCREEN1,1:PM
ODE3:GOSUB1206:PAINT(128,56),R,R
:GOTO1208
1206 CIRCLE(128,76),40,R,.9,.45,
.99:DRAWR$+"BM166,76F6DF2D2M-18,
+40G4LGLGL4UL4UL4UL4M-20,-8H2L2H
2L2H2L2U4G2L2G2L2U4H2U2H2U2H2U9E
2R2E2R2":RETURN
1208 FORI=42TO136STEP2:PUT(0,I)-
(240,I+1),Y,OR:NEXTI:GOSUB1206
1210 DRAW"L2U2L2M-46,+18G10M+16,
+4E12NH6M+27,-9M-27,+9G12M+42,-1
4NF6U4L2U6R2UR2UR2F2DF2D5UNL4UNL
4UNL4D8NH4U8NH4U10"
1212 DRAW"BF28BL4ND4M-10,-20U6R2
UR2M+10,-4D2M-8,+4D6R2D2BR6U6R2E
2R2UR2UR2UR2R14F4DF2D6L2D6L2D6G2
DG2L10H14U9R2UR2UR2UR2UR18F2DF2D
8L2D2L2D6G2NL8UL10H14R12NF6R2NF4
R6D2NL2R6UNL8"
1214 DRAW"UNL10UNL18UR2ND6L22ND2
LND2LND2U3C4R24"+R$+"BR8U4NH8R2N
D4NH8U2NR4UNR4UNR2L4H6L2U2H2L2D4
NR2L12UNL2UR2U2H2U2G8ND4NR2E8BL6
NL4U2R2U2NE4L2UL2UL2UNL12L2UNL12
L2UL12R2D4L2D4L2D4"
1216 DRAW"BR4UR2UR2UR2UR6BU4L6DL
4D2BU12NR34DL4DL4BU4R36BU4NL26BD
14NE4RNE4RE4R10L2UL8D8R10DNL10NR
2U4L10UNL4NR6D6R10BL22L8UL10UR8B
U30R8U6R2U6L28M-8,+20"
1218 PAINT(122,30),R,R:PAINT(42,
114),R,R:PAINT(2,2),B,R
1220 DRAW"C4BM16,10D134NL20U134E
4R210F4D136NR20L2D2L2D2F2DF2DF2D
2F2D4G2L2G2L2G2L9H2L2H2L2G2L2G2L
2G2L8L2UL2UL2H2UH2UH2U2L4G2L2G2L
2G2L2G2L2G2L6H2L2H2UH2UL2M-18,+8
L4M-8,-4M-18,+4"
1222 DRAW"L4M-6,-4L4G8L4":CIRCLE
(46,164),28,4,.9,.1,.36:DRAW"BL4
0BD4G12L4H4M+20,-18M+7,-30L4DL4D
L4DL2DL2DL4U8M+30,-15R2UR2E8R6M-
6,+8"
1224 CIRCLE(58,134),20,4,.8,.76,
.22:CIRCLE(58,160),16,4,.8,.76,.
12:DRAW"BD48BR10M+14,-9R2U4R2U4L
2U4R8D2RD2R8F2D2L2D4L2D4F2R4E2UE
2"
1226 DRAW"UE2UE2M+10,-6R6F4U4R6F
2M-4,+8F2R4UR2UR2U6R2U2R2U2R4DR4
D6L2D2L2D4F2R4M+10,-5U4L2U6R4UR4
D6R4UR4U2R2UR2UR2UR2UR2UR2UR6D6L
2DL2DL2D4FR4D4L4DL4G2D2F2R4UR2UR
2UR2UR2UR2E10U10R10D4"
```



```
1228 PAINT(58,160),R,4:PAINT(4,3
),4,4
1230 DRAW"BG2BD3G6D4F2R4E2U2H2U3
BL98BDD4L2D2G2L4H2U4R2UE2R4"
1232 CIRCLE(54,136),10,4,.8,.76,
.32:CIRCLE(44,164),16,4,.8,.79,.
32:DRAW"BL80BU2M-6,+22M+12,-44"
1234 PAINT(54,136),B,4:PAINT(44,
164),B,4:PAINT(122,160),B,4:PAIN
T(226,160),B,4
1236 GOTO1242
1238 PAINT(4,3),4,4
1240 FORI=12TO150STEP2:PUT(0,I)-
(240,I+1),Y,OR:NEXTI
1242 IFINKEY$<>CHR$(13)THEN1242E
LSERUN
```

LEARN THOSE 'TRICKY WORDS'

By Penny L. Rand

This program provides practice in the correct use of frequently misused contractions and possessives (its, it's, your, you're, etc.). It works well with my seventh graders; language arts teachers from grades three on up should find it useful. It can be easily modified to include vocabulary and spelling words for any grade level.

Tricky Words uses a randomly colored background and a colorful border to highlight a sentence which is missing a word. Two choices are given, one of which will correctly fill in the blank. I designated the choices '1' and '2' instead of 'A' and 'B' because numbers are easier to find and closer together on the keyboard than letters.

If the correct answer is picked, one of 10 different words indicating success will flash on the screen. If an incorrect response is given, one of 10 different words indicating an error will flash, then the correct answer will be printed on the screen. If the same response is always given when the student picks the right or wrong answer, it can quickly become boring, so I wanted to make sure each response is different.

If the student completes eight out of 10 questions correctly, he will be greeted by a message which says he has done a good job and is finished. If, however, the student gets less than eight correct, he will be notified by a message that he must do the exercise again until he gets at least eight correct; the computer will automatically restart the program.

Tricky Words can be easily modified for use with any kind of exercise which can be set up to have two choices of answers, one of which correctly fits into a blank in a sentence or correctly answers a short question. Changing the sentences or questions only involves retyping the last 10 data statements of the program, lines 401 through 410. Each statement contains seven pieces of information:

1) First, type the sentence or question. Put in the appropriate end mark for the sentence and follow it by a comma. Try to keep the sentence to 29 spaces or less. If more than 29 spaces are used, the program will still work, but the sentence will bleed into the border and will not look as attractive.

2) Type one of the two choices of answers you wish to provide for the sentence. Follow this with a comma.

LIKE MAGIC

3) Type the other answer choice you wish to provide. Follow this with a comma.

4) Type either 1 or 2, whichever is the placement of the correct answer ('1' if the correct answer is the first of the two choices listed; '2' if you listed the correct choice second). Follow this number with a comma.

5) Type the correct answer again. (This is the data the computer will use to inform the student of the correct answer if he chose the wrong answer to begin with.) Type a comma.

6) Type whatever word you wish to use to indicate success ("great," "good," "excellent," etc.). Type in a comma.

7) Type whatever word you want to indicate an error ("sorry," "wrong," "too bad," etc.). Do *not* type in a comma this time.

The listing: TRIKWORD

```
120 .......50
250 ......230
END .....215
```

```
10 'TRICKY WORDS
11 'PENNY RAND
15 'R2 BOX 385E
20 'PRESQUE ISLE, MAINE 04769
25 'JANUARY, 1985
35 CLS3
40 GOSUB300
80 PRINT @234,"TRICKY WORDS";
85 FOR X=1 TO 2000:NEXT X
90 CLS4
91 PRINT@229,"TYPE YOUR FIRST NA
ME";:PRINT@296,"AND PUSH ENTER."
;
92 GOSUB300
93 INPUTN$
94 C=0:W=0:RESTORE
95 FOR M= 1 TO 10
96 Y=RND(8):IFY=1 THEN 96
97 CLS(Y)
99 PRINT@65,"PRESS 1 OR 2 TO IND
ICATE":PRINT@97,"THE CORRECT ANS
WER. THEN":PRINT@129,"wait FOR T
HE NEXT QUESTION."
100 GOSUB300
110 READ A1$,A2$,A3$,A4$,A5$,A6$
,A7$
119 'SET UP QUESTION AND TWO ANS
WERS
120 PRINT@194,A1$;:PRINT@265,"1)
"A2$;:PRINT@297,"2)"A3$;
130 B$=INKEY$
140 IFB$=""THEN 130
149 'CORRECT RESPONSE
150 IFB$=A4$THEN PRINT@386,A6$"!
";:SOUND 147,5:SOUND 175,5:FOR T
=1 TO 500:NEXT T:C=C+1
159 'INCORRECT RESPONSE
160 IFB$<>A4$THEN SOUND 50,5:PRI
NT@353,A7$", "N$".";:PRINT@385,"
THE CORRECT ANSWER IS "A5$".";:F
OR T=1 TO 1800:NEXT T
170 NEXT M
200 CLS(Y)
205 IFY=1 THEN 200
210 PRINT@65,N$",";
219 'END DISPLAY IF SATISFACTORI
LY COMPLETED
220 IF C>7 THEN PRINT@161,"YOU G
OT"C"CORRECT OUT OF 10.":PRINT@1
93,"YOU ARE FINISHED.  GOOD JOB!
":GOSUB300
229 'END DISPLAY IF UNSATISFACTO
RILY COMPLETED
230 IF C<8THEN PRINT@161,"YOU GO
T"C"CORRECT OUT OF 10.":PRINT@19
3,"YOU MUST DO THIS PROGRAM OVER
":PRINT@225,"UNTIL YOU GET AT LE
AST 8 RIGHT.":PRINT@289,"wait!!
THE COMPUTER WILL RESET":PRINT@3
21,"ITSELF.":GOSUB300:FOR X=1 TO
 7000:NEXT X:GOTO94
250 GOTO250
290 'BORDER
300 H=RND(128)+127
310 FOR X=32 TO 63:PRINT@X,CHR$(
H);:NEXT X
320 FOR X=480 TO 511:PRINT@X,CHR
$(H);:NEXT X
330 FOR X=0 TO 448 STEP 32:PRINT
@X,CHR$(H);:NEXT X
340 FOR X=31 TO 479 STEP 32:PRIN
T@X,CHR$(H);:NEXT X
350 RETURN
400 'QUESTIONS AND ANSWERS
401 DATA ?  HIS APPLE.,ITS ,IT'S
,2,IT'S,CORRECT,SORRY
402 DATA ?  MAIL IS LATE.,YOUR
,YOU'RE,1,YOUR,GOOD GOING,WHOOPS
403 DATA ?  BOOKS ARE RUINED.,TH
EIR,THERE,1,THEIR,ALL RIGHT,TOO
BAD
404 DATA LET'S GO  ?  THE MOVIES
.,TOO,TO ,2,TO,GREAT,AFRAID NOT
405 DATA ?  ARE SIX BOYS ABSENT.
,THERE  ,THEY'RE,1,THERE,NICE GO
ING,NOT QUITE
406 DATA THE CAR HAS LOST  ?  SH
INE.,ITS ,IT'S,1,ITS,EXCELLENT,I
NCORRECT
407 DATA I EARNED  ?  DOLLARS.,T
OO,TWO,2,TWO,SUPER,NOT EXACTLY
408 DATA ?  NOT BEING QUIET!,THE
Y'RE,THEIR  ,1,THEY'RE,VERY NICE
,NOT REALLY
409 DATA I LIKE CHOCOLATE  ?  MU
CH.,TO ,TOO,2,TOO,WAY TO GO,WRON
G ANSWER
410 DATA ?  INVITED TO MY PARTY.
,YOUR  ,YOU'RE,2,YOU'RE,GOOD,OOP
S
```

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PIPELINE

NEW KID. A three-year plan to raise $4.5 million to equip each of the 85 elementary schools in the Louisville, Ky.-area school system with 32 computers is off to a fast start. The "New Kid in School" program was launched in 1984 and $1.4 million has been raised by the system in cooperation with business and industry.

One of the school system's most unique fund-raisers was a series of yard sales at the schools, which raised $47,000 in one day. Other attractions included bake sales, pizzas, tethered hot-air balloon rides, movies, break dance lessons, chili suppers and door prizes.

* * *

OS-9 PROCESSING. Computerware has introduced the *OS-9 Text Formatter* which provides documentation for reports. Features include centering, special margins and spacing, footnotes, page headings, etc.

The program interfaces with any editor that produces standard ASCII text files. It also is a UNIX-type formatter and said to be easy to use. The user simply embeds any of dozens of print commands in the text file to format the document.

Write: Box 668, 4403 Manchester Ave., Suite 102, Encinitas, CA 92024.

* * *

CHANGE OF ADDRESS. JTJ Enterprises, the company that developed *CoCo Solver* (an equation-processing program) and *CoCo Base I* (a database sorter) has a new address. Mail inquiries to: P.O. Box 118041, Nashville, TN 37211; telephone: (615) 331-0364.

SPORTS LINE. The sports and racing database of Computer Sports World (CSW) of Las Vegas is now carried by Business Computer Network. CSW provides up-to-the-minute results, scores of games in progress, Las Vegas "line" data, statistics and current information on horseracing, football, basketball and other sports.

Subscribers to the Business Computer Network are automatically registered as CSW subscribers and will be able to access the database.

* * *

QUIET, PLEASE! A new printer stand has been introduced by Howard Medical Company that significantly reduces the noise and vibration of dot matrix printers. Shaped from a single piece of stylish smoke gray plexiglas, the stand has a permanently bonded cushioned top that muffles much of the sound. A thin tread of cork underneath the stand protects furniture and absorbs the vibration. Write: Box 2, Chicago, IL 60690.

* * *

HELP WANTED. Frustrated job seekers will want to access a new electronic service called U.S. Employment Opportunities, which is available through NewsNet and maintained by Washington Research Associates of Arlington, Va.

"Professional job hunting is an information-gathering process perfectly suited to computer application," says Joseph Ryan, editor of the service. "Job hunters in the '80s use virtually the same methods of gathering information as they did in the '60s — not the 1960s. I mean the 1860s."

Ryan says that companies from across the country send job vacancy information daily for inclusion in the new database.

Currently, USEO has job information for three major fields — banking/finance, advertising/public relations and federal government employment. A fourth, the computer field, is expected soon. Within two years USEO expects to have 20 or more separate fields.

For more information, write: Washington Research Associates, Editorial Office, 2103 N. Lincoln St., Arlington, VA 22207, or call toll free: 800-345-1301.

* * *

STAR BRIGHT. An annotated bibliography of astronomical software has been published by the non-profit Astronomical Society of the Pacific. The list includes 45 programs available on disk or cassette for a variety of computers, including Tandy. Each description includes details on what the software does, along with the address of the manufacturer. The bibliography also contains an introductory reading list of books and magazines.

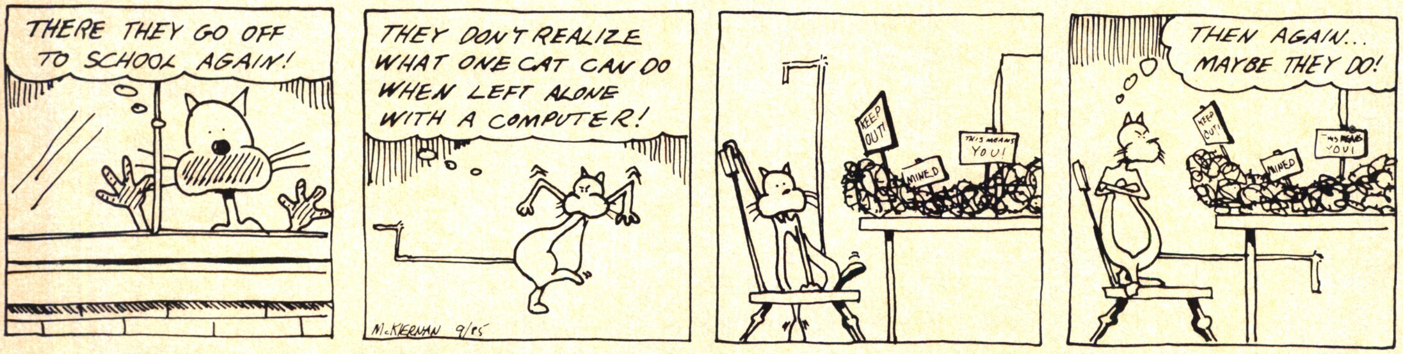
To obtain a copy, send a donation of $1 to A.S.P., Computer List, 1290 24th Ave., San Francisco, CA 94122.

* * *

VOICE MAIL. Now you can get your electronic mail and Telex messages without a computer. Mnematics Videotex has introduced Voice Mail Service, which allows subscribers with touch dialing features to call a special number and have E-Mail and selected features read to them by computer-generated speech.

The caller enters his/her I.D. number and password using the telephone's number pad. Voice prompts indicate if E-Mail is waiting, the name of the sender, the subject and the time required to read each letter. Write: Mnematics Videotex, Sparkhill, NY 10976-0019.

CoCo Cat


THERE THEY GO OFF TO SCHOOL AGAIN!
THEY DON'T REALIZE WHAT ONE CAT CAN DO WHEN LEFT ALONE WITH A COMPUTER!
McKIERNAN 9/85
KEEP OUT!
MINED
THIS MEANS YOU!
THEN AGAIN... MAYBE THEY DO!
KEEP OUT!
MINED
THIS MEANS YOU!

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A CHIP OFF THE OLD...

6821 Standard PIA	$9.95
27128 Eprom - Fits new ctlrs*	$14.95
6809E CPU Chip (NEW LOW PRICE)	$19.95
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68766 (Fits Disk Basic Skt) Eprom	$19.95
Disk ROM 1.1 (New DOS Command)	$29.95
New SAM Chip w/heatsink (74LS785)	$29.95
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28 pin Ext Basic-upgrade 26-3134A	$34.95
26-3134A & 26-3136A 64K Upgrade - 2 chip set (ONLY for new Korean CoCoIIA)	$39.95
Eprom Eraser - 3 min erasure time	$49.95
Lower Kit Bd - Specify CoCoI/II**	$59.95
CoCo First Aid Kit - includes 2 PIAs, 6809E & SAM (Be Prepared!!!)	$59.95
Eprom Prgmr (2ms speed/2K - 16K)	$139.95
64K CoCo II - w/NEW keyboard	$149.95

COCO LIBRARY...

CoCo Memory Map	$14.95
Rainbow Book & Tape of Adventures	$14.95
Basic Programming Tricks Revealed	$14.95
The FACTS - Inside "guts" of CoCo	$14.95
500 Pokes, Peeks 'N Execs	$16.95
Basic 09 Tour Guide	$18.95
Utility Routines- Top Pgm Secrets	$19.95
Rainbow Book/Tape of Simulations	$19.95
Extended Basic Unraveled	$19.95
Disk Basic (1.0/1.1) Unraveled	$19.95
New! CoCo II Service Manual	$19.95
The Complete Rainbow Guide to OS9	$19.95
W/Two Disk Package of demo pgms	$49.95
Ultimate CoCo Ref Guide- 350+ pgs	$29.95
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28pin/24pin Adapter - Plug-in new 128K JDOS 1.2 in older J&M ctlrs	$19.95
CoCo Freeze Frame - Freeze your CoCo screen at anytime/Hardware switch	$19.95
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PBJ WORD-PAK II - Hi-Res 80x24 display w/smooth scrolling & 8x10 matrix	$139.95

* - J&M and the NEW Super Controller

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Printer/Modem 15' Extender Cable	$14.95
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Joystick/Mouse 10' Extender Cable	$19.95
Null Modem Cable - 4 pin to DB25	$24.95
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40 Pin Dual "Y" Cable - Hook up a Disk w/Voice, Word Pak, CoCo Max, etc	$29.95
Triple RS232 Switcher - Now select one of any three RS232 peripherals	$39.95
Triple "Joyport" Switcher - Joystick, Mouse, Wico Adapter or Light Pen	$39.95
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C-10 tapes in any quantity	49 cents
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The Disk Doubler - Doubleside your 5 1/4 diskettes for 160K more storage	$19.95
Video Clear - This cable will reduce TV interference created by CoCo!	$19.95
Video Reverser -Reduce eyestrain w/green letters on black background**	$24.95
The Magic Box - Load Mod I/III Basic program tapes into the CoCo	$24.95
DOS Switcher - Select from any two DOSs (Disk 1.0 1.1, JDOS) in J&M ctlr	$24.95
1984 Rainbow On Tape (12 issues)	$79.95
EARS-CoCo's first Voice Recognition unit w/95% accuracy & 64 Voice Prints!	$99.95
Amdek Twin 3" Drive System	$199.95
Amdek Drive System w/controller	$299.95

** NOT for 26-3134/36 CoCo II's

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SPECIAL 64K RAM CHIPS $19.95

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SPREADSHEET

	Competition	DYNACALC
Screen	32X16	51X24
Precision	9 digits	16 digits
Hi-Res Graphics	NO	YES
Visicalc cmd format	NO	YES

New low price! 64K Disk $79.95
Side Wise -Print DYNACALC files up to 255 chars-sideways! $19.95

SAVE $60

BUY 'EM BOTH FOR
(DYNACALC & PCF 2.0 ONLY)
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PRO-COLOR FILE 2.0 - 60 Data Flds, 8 Report Fmts, 4 Screen Fmts, 1020 bytes/record, Sort 3 Fields, Global Search, FAST ML Sort, Create Files Compatible w/DYNACALC! - Disk $59.95
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DRIVE 0 System* - SS/DD, 6ms, 40 Tracks, Half Height .$229.95
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10 meg Hard Drive/OS-9* - $1295
* PLUS: controller-manual-cable

GAME CONTROLLERS

Graphicom Joystick - Has 2 Fire buttons (menu/pen), smooth and easy joystick control - $24.95
Mach II Joystick - 360 Degree control with center return or analog positioning. - $39.95
Wico Command Control - Hook up 2 Atari type joysticks - $19.95

SUPER CONTROLLER

The most AMAZING CoCo Disk Controller ever! Switch up to 4 DOS's (up to 16K!) via a single software POKE! Uses 27128 or 2764 EPROMS. Choose between Dsk 1.0/1.1, Spectrum DOS, JDOS, etc. Designed by "Turn of the Screw" Guru- T.DiStefano $99.95

NEW

256K CORNER

Thunder RAM - First 256K memory Bd for CoCo! Load 4 32K pgms at once, emulate a 40 trk Ramdisk, 60K Print Spooler, FAST access, 30+ Hi-Res screens in memory!!!
Thunder RAM Bd w/256K ..$119.95
OS-9 Ramdisk software !! $24.95
* NOT Available for CoCo II's *

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COMMUNICATION

COLORCOM/E - A complete smart terminal package! Upload, Download, Hi-Res (51X24) screen, 300/1200 Baud, Offline Printing. Rompak/Disk* - $39.95
* - Now with CoCo Sig & TBBS XMODEM support! Download ML!
COMPUSERVE 5hr Start Kit $39.95

COLORCOM/E NOW $39.95 SAVE $10.00 !

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TELEWRITER-64 - Three Hi-Res screens, true lowercase char's right justify, full screen editor. Tape $49.95 Disk $59.95
TELEPATCH - A TW-64 enhancer!!! True block move, Overstrike & TSPOOL mode, Key beep & repeat FASTER Disk I/O 64K Disk $19.95

BUY BOTH SAVE $10

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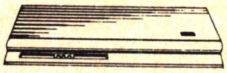
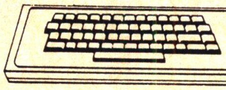
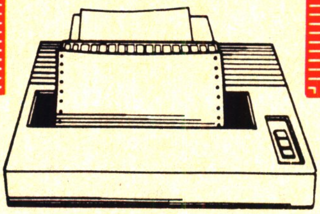
MINI-MODEM - Direct connect, 300 Baud, Orig/Answer - $49.95*
J-CAT Modem - Lowest priced auto/answer modem - $119.95
HAYES SM300 - "Programmable" auto-dial/auto answer - $199.95
300/1200 Baud Modem! - $199.95*
* - Add $14.95 for Modem Cable







PRINTERS

GEMINI SG-10 - 120 cps w/true descenders, 2K buffer, tract-frict feed, Near Letter Quality mode, 1 Yr. warranty! - $249.95
BriteFace-The first INTELLIGENT Parallel Ptr Interface for CoCo Auto set Baud rates from 600 to 9600/NO switches to turn $59.95

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SUPER-PRO (Mark Data) $59.95*
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Specify Model/Revision Board.
* Add $5 for "F" board adapter
** Free function key software
CoCo II HJL version available!!
15 key Numeric Keypad - $59.95

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TAXAN Tuner-Receive TV channels on any composite monitor.$99.95
Universal Video Driver - Works w/all monitors & CoCos!- $29.95

SAVE $10 OFF COLORCOM/E WITH ANY MODEM
OFF TELEWRITER-64 WITH ANY PRINTER, KEYBOARD OR MONITOR **SAVE $10**

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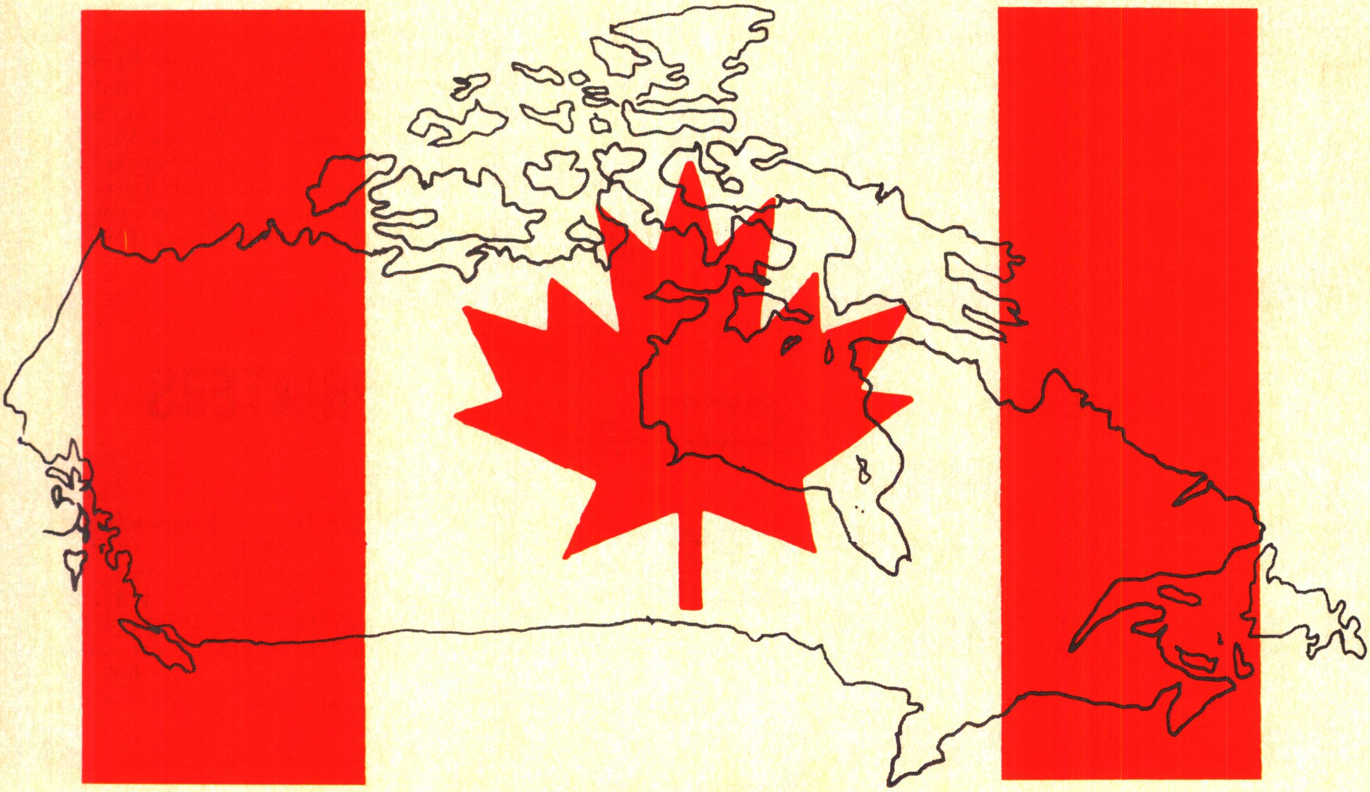
16K
ECB

Test your geographical knowledge or use it to learn; either way you'll find this program educational as well as enjoyable.

Oh! Canada



By Russ F. LaBelle

An educational program which was originally designed for my children to assist them in their geography, *Canada* is written in Extended BASIC and begins with a cover page of the map of Canada. A few bars of the Canadian national anthem are played prior to the test.

The test itself consists of 11 questions asking the student to name the capital cities of all 10 provinces plus the nation's capital. If the student answers correctly the "Charge" is played. If they answer incorrectly, the "Death March" is played and the correct answer is displayed. I included a "Press ENTER to continue" portion here so the kids had enough time to study the correct spelling of the cities.

Upon conclusion, the students are given a report card which tells them how many correct answers they gave. The program also gives them the option of trying again.

(Any questions about *Canada* may be directed to Mr. LaBelle at Box 1528, Bonnyville, Alberta, Canada T0A 0L0, phone 403-826-5231.)

(Russ LaBelle has had his CoCo for three years and enjoys its graphics capabilities and doing educational programs. He is the father of three children.)

☆☆ FOURTH ANNIVERSARY SALE ☆☆

64K CHIPS $14.95

DISK DRIVE 0 $199.95

To help celebrate Spectrum Projects Fourth year in supporting the CoCo, we are offering a truly unbelievable once in a lifetime deal! Buy any software from our 2 page "Colorful Utilities" ad* and get a set of (8) 64K CoCo chips for only $14.95 and/or a Disk Drive 0 for only $199.95. Expires 10/10/85. Order now as quantities are limited! Sorry, no rainchecks! (*Or CoCo Max)

INSTRUCTIONS FOR BOTH COCO I & COCO II INCLUDED !

COCO MAX

64K Tape Version Now Available !

FEATURE PACKED SYSTEM :

- Pull-Down Menus
- Undo your mistakes
- Full graphic editing
- "Point-and-Click"
- Fat Bits "Zoom"
- Hardware ROMPAK
- Icons & Font Styles
- Full Size Screen Dump
- 32 paintbrush shapes
- Use w/video digitizer
- 256x192 joystick input
- By COLORWARE

Requires Multi-Pak or Y-Cable

64K DISK $69.95 Y-CABLE $29.95

Gives your $200 CoCo the power of a $2000 MAC hine !

MICROWORKS DIGITIZER $149.95

SHIPPING $3.00 (FOREIGN $5.00) - COD $2.00 EXTRA - NY RES. ADD SALES TAX

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⌖⌖⌖ COLORFUL UTILITIES ⌖⌖⌖

COCO CHECKER *

Something possibly wrong with your CoCo??? CoCo CHECKER is the answer!! Will test your ROMs, RAMs, Disk Drives & Controller, Printer, Keyboard, Cassette, Joysticks, Sound, PIAs, VDG, Internal Clock Speed, Multi-Pak Interface and more!! 16K TAPE/DISK **$19.95** (see Jan '85 Rainbow Review)

MULTI-PAK CRAK

Save ROMPAKs to your 64K Disk system using the RS Multi-Pak Interface. Eliminate constant plugging in of ROMPAKs now by keeping all your PAK software on disk. Includes POKEs for "PROBLEM" ROMPAKs. (Downland, Megabug, Micro Painter, Stellar Lifeline, etc..) 64K DISK **$24.95**

TAPE ʹN IMAGE

Easily handles programs with auto loaders, no headers, no EOF markers, unusual size blocks and more! Now is the time to get your tape software collection protected ... against loss!!! TAPE **$24.95**

SPIT ʹN IMAGE

A super upgrade from Disk Omni Clone! Back everything up! This amazing program handles "non standard" disks with ease. We haven't found any disk yet that it can't handle. Don't ever be caught without a backup again! Lowest price too! Beats most "copy protection" programs! 32K DISK **$29.95**

COCO SCREEN DUMP

The best screen dump program for the Panasonic, Epson & Gemini printers ever! Have the option of standard or reverse images w/regular or double sized proportional pictures. 600-9600 Baud too! A must for Graphicom and Bjork Block users. 16K TAPE/DISK **$19.95** (see Nov '84 Rainbow Review)

DISK UTILITY 2.1*

A multi-featured tool for USER FRIENDLY disk handling. Utilize a directory window to selectively sort, move, rename and kill file entries. Lightning fast Disk I/O for format, copy and backup. Examine contents of files, the Granule Table, plus the size, load addresses and entry points of all programs. Single command execution of both Basic and ML programs. 32K/64K DISK **$24.95** "Disk Utility has proven itself very quickly at my house" - Ed Ellers Oct '84 Rainbow Review pg. 220

NEW!

THE OS-9 SOLUTION

NOW, a program that creates a "USER FRIENDLY" environment within OS-9! The OS-9 SOLUTION replaces 19 of the old "USER HOSTILE" commands with single keystroke, menu driven commands. No more typing in complex, long pathnames or remembering complicated syntaxes! Set all XMODE parameters at the touch of keys! Requires OS-9 Ver. 01.01.00 **$39.95** (see May '85 Rainbow pg. 254)

SPECTRUM DOS

Add 24 NEW Disk commands with 2 Hi-Res screens! Supports 40 track & Double-Sided drives, 6 ms stepping, auto disk search, error trapping & "EPROMABLE". 64K DISK ~~$49.95~~ New LOW price!! **$24.95**

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Save time and design pro looking diagrams using a 480X540 pixel worksheet w/6 viewing windows. Over 30 electronic symbols w/10 definable symbols. (Even Logic gates & Multipin chips!) Print hard copy and save to disk. 64K DISK ~~$49.95~~ New LOW price!!! **$29.95** (see Jan '84 Rainbow Review)

COLORAMA

A first-class Bulletin Board package... especially geared towards CoCo users... has an ordering section for those who want to run a mail-order business... supports Color Graphics... one nice piece of work. 64K DISK **$99.95** July '84 Rainbow pg. 235. NEW! COLORAMA BBS Time Module **$59.95**

COCO CHECKBOOK

Use your CoCo to keep track of your checking and savings accounts! Printout individual personal checks! 32K/64K TAPE **$29.95** DISK **$39.95** (see April '85 Rainbow Review pg. 210)

*** NOW AVAILABLE BY EXPRESS ORDER**
AT YOUR LOCAL Radio Shack STORE -

#90-0289 COCO CHECKER - #90-0290 DISK UTILITY 2.1
DEMAND TO SEE THE DEMO DISK !!!

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COLORFUL UTILITIES

FAST DUPE II

The fastest Disk copier ever! Will format and backup a diskette in only one pass (up to 23 grans) and can make up to 4 Disk copies at once in 2 minutes! The must utility for every multiple Disk Drive owner. Fixes the "head-banging" bug! 32K/64K DISK **$19.95** (see May '84 Rainbow Review)

COCO VIDEO TITLER

Start your VCR tapes with dazzling title frames followed by professional countdown to black fade-outs! Use a title page editor with several sizes of text & background colors! 16K TAPE **$19.95**

AUT-O-START

Autostart your Basic/ML programs with impressive title screens using a mixture of text and graphics! 16K TAPE **$19.95** "Aut-O-Start is an excellent program" June '85 Rainbow Review

64K DISK UTILITY PACKAGE

Take advantage of an expanded 64K machine. Make an additional 8K of RAM available by relocating the Ext Basic ROM from $8000 to $D800. Copy ROMPAKS to disk (even "protected" PAKS) and create a 32K SPOOL buffer for printing. DISK **$21.95** (see July '83 Rainbow Review)

TAPE/DISK UTILITY

A powerful package that transfers tape to disk and disk to tape automatically. Does an automatic copy of an entire disk of programs to tape. Ideal for Rainbow On Tape to disk. Also copies tape to tape & prints tape & disk directories. TAPE/DISK **$24.95** (see Sept '83 Rainbow Review)

FAST TAPE

Save and load cassette files at twice the speed! Now you can run tape and printer I/O operations in the high speed mode without a locked up system or I/O ERRORS! Works great with the popular Telewriter-64 word processor tape by Cognitec. "If you are tired of waiting for those long tapes to load, I strongly recommend that you buy this fine utility." TAPE **$21.95** July '83 Rainbow

GRAPHICOM

The ultimate CoCo graphics development tool with sophisticated editing, preview animation, telecommunications and printer support. Hi-Res graphics for only **$24.95.** W/Spectrum's Menu Foot Switch **$34.95** or W/Spectrum's Graphicom Joystick **$49.95.** 64K DISK (see April '84 Rainbow Review)

EZ BASE

A truly user friendly data base program at an affordable price. Maintain inventories, hobby collections, recipes, greeting card lists and much, much more! Hi-Res screen, up to 500 records with 15 fields, record or field search, and a Mailing Labels option. Also converts EZ BASE data files to ASCII format for transmission via Modem! 32K DISK **$24.95** (see July '84 Rainbow Review)

COCO-UTIL

NEW! Now you can have the power to easily transfer Radio Shack Color Computer disk files to your MS-DOS machine - including the Tandy 1000 & IBM PC!!! You can also transfer MS-DOS files to your CoCo disk, even format CoCo disks! CoCo-Util will save you countless hours of retyping! No need to move your computer or printer anymore! Requires 128K MS-DOS computer w/2 disk drives - **$29.95**

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25 220
80 148
END 252

The listing: CNDCAPTL

```
1 ' CANADIAN CAPITAL CITIES
2 ' BY RUSS LABELLE
3 ' BOX 1528
4 ' BONNYVILLE, ALBERTA, CANADA
5 PMODE3,1:PCLS:SCREEN1,0
10 DRAW"BM44,4G40F4G2D2F2D2R2F4D
4G2D10G2D10F2D4F2D2F2D4F2D4G2D6G
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D2F2D2F2GG4L2G2L2H2L2U6H2U2H2U4H
2L2H2L10U2H2L2H2U8H2U2H2L2H2
20 DRAW"BM106,74U2H2U2E4U2R2E10U
4H4L2U2L2H2U2H4U2E2R2E2R2E2H4U2H
2U2H2L4G2D2L2D8G2D2L2H2L6H2D2L2H
2U4H4L2H2L2H6L4H2L2G2L2H4L2H2
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2E4H4U2E2U2H2L10H2L2BR34G2D2L2G2
D2R4F2R4E2R2E4R2F8R6F4R4F2D6L2G2
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2H4L2H2L2H4L2H4L50R50BD48BL28L2G
2D6L2F4E2U2E2R2E2H2L2H2
30 DRAW"BM254,92L2H2U2D2L2G2U18G
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2D2G2F2E6U28BL24BD44D2L4H4U2R2F4
D2
40 PAINT(0,200),3,4
45 DRAW"C2;BM62,64L10D14R10BR18U
14R10D14U6L10BR28BD6U14F6D2F2D2F
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R18U14R8F2D10G2L8BR28U14R10D14U6
L10
50 DRAW"C2;BM6,122U8R6D4L6BR12D4
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4BR6U8F4D2F2U8BR6R4F2D4G2L4U8BR2
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4L6BR14D4L2R2U8L2R4BR4R8L4D8
55 DRAW"C2;BM218,114R6D8U4L6U4D8
BR12U8D8R6BR6R6U4L6U4R6
60 PLAY"T2O2L2AO3CL8CO2L2FP4L4GA
;11;O3CDO2L2G;P4ABL8BO3L2CP4L4DE
EDDL2C
70 CLS:PRINT:PRINT"CANADIAN PROV
INCES AND CAPITALS *************
******************"
75 PRINT@164,"HOW WELL DO YOU KN
OW THE         CAPITAL CITIES OF
CANADA?"
80 PRINT@356,"PLEASE ENTER YOUR
NAME      ";:INPUTN$
100 RIGHT=0
105 RESTORE
110 DATA BRITISH COLUMBIA,VICTOR
IA
120 DATA ALBERTA,EDMONTON
130 DATA SASKATCHEWAN,REGINA
140 DATA MANITOBA,WINNIPEG
150 DATA ONTARIO,TORONTO
160 DATA QUEBEC,QUEBEC CITY
170 DATA NEW BRUNSWICK,FREDERICT
ON
180 DATA NOVA SCOTIA,HALIFAX
190 DATA PRINCE EDWARD ISLAND,CH
ARLOTTETOWN
200 DATA NEWFOUNDLAND,ST.JOHN'S
210 DATA CANADA,OTTAWA
220 FOR X=1 TO 11
225 READ A$,B$
226 CLS(4)
230 PRINT@160,"     WHAT IS THE
CAPITAL OF":PRINT"     "A$:PRINT
@256,"   ";:INPUTC$
240 IFC$=B$ THEN RIGHT=RIGHT+1:I
FC$=B$ THEN CLS(3):PRINT@236,"CO
RRECT";:PLAY"T2P4V15L16O4CEGL8O5
CL16O4AL4O5C":GOTO260
250 CLS(0):PRINT@192,"     SORRY
 THE ANSWER IS":PRINT"     ";:PR
INTB$:PLAY"V25T3O3P4L2CL3CL8CL2C
E-L8DL3DL8CL3CO2L8BO3L2CP2"
255 PRINT@322,"PRESS <ENTER> TO
CONTINUE";:INPUTA$
260 NEXTX
270 CLS:PRINT@162,N$"'S REPORT C
ARD":PRINT@226,"NUMBER CORRECT =
"RIGHT;"OUT OF 11"
280 PRINT@386,"DO YOU WANT TO PL
AY AGAIN";:F$=INKEY$:IF F$=""THE
N 280 ELSE IF F$="Y"THEN 100 ELS
E CLS:END
```

(For corrections pertaining to other articles or programs, see Page 225.)

CORRECTION — "Destination: Moon Base Amphibia"

"Destination: Moon Base Amphibia" (August 1985, Page 106): The printed listing on pages 108 to 119 of our August issue has a number of incomplete lines. The reason is these lines were packed with additional statements to such an extent that they did not list properly, and the incomplete printout was not discovered in time to correct. We regret any inconvenience and frustration this editorial oversight may have caused those readers who typed in this program.

What happened? BASIC stores each command word (`GOTO`, `PRINT`, `FOR` and the like) as a single-byte "token"; when you list a program to the screen or the printer, edit a line or save the program in ASCII (on tape or disk), a special routine puts the words back in place of the tokens. If an extremely long line has been entered (either by using the `EDIT` mode to cram them in or by using a special packing program) it's possible for the de-tokenizing routine to run out of buffer space and just drop off everything after the first 248 characters.

If you have the August RAINBOW ON TAPE, please note that the copy of *Amphibia* on the tape *does* run properly, but if you try to `LIST` or `LLIST` it you will have the same problem that we did for the same reason. The commands are there, but you just can't see them or print them out.

To solve the problems that the packed lines cause in entering the program by hand, follow these instructions. Using the `EDIT` command, change the ends of the following lines in Listing 1:

20 - Delete : (just the final colon)
910 - Delete : (just the final colon)
1000 - Leave as is (Although commands are missing, they will be inserted in a separate line.)
1016 - Delete `:PAINT(214`
1100 - Leave as is
1200 - Delete `:IFY<72THENY=7`
1218 - Delete `:PAINT(116,5`
1300 - Delete everything from `:D1$="U4` (on through end)
3000 - Delete `:GET(20,90) - (46,105),A1,`
3010 - Delete `:PAINT(40,55),,`
3028 - Delete `:LIN`
3052 - Delete `:LINE(`
3100 - Delete `:FORX=120TO130ST`
3142 - Delete `:PAINT(95`
3162 - Delete `:PM`
3220 - Delete `:P`
3246 - Delete `:PMODE3`
3300 - Delete `:PAINT(100,`
3316 - Delete `:DRAW"BM"+`
6905 - Delete `:GOSU`
7905 - Delete `:FO`
9500 - Leave as is
9900 - Delete `:PRINT@227,"PRESS <ENT`

Now key in the following new lines:.

```
21 PRINT@388,"PRESS <ENTER> TO B
EGIN";

911 BG=5254:BX=5

1001 PSET(X1,Y+1):X1=X1-1:Y=Y-2+
RND(3):IFY<80THENY=80ELSEIFY>96T
HENY=96

1017 PAINT(214,60),,1:POKE178,1:
PAINT(0,70),,1:RETURN

1101 COLOR1,0:LINE(0,170)-(255,1
92),PRESET,BF:LINE(0,170)-(255,1
92),PSET,B

1201 IFY<72THENY=73ELSEIFY>88THE
NY=87

1219 PAINT(116,52),,1:PAINT(216,
49),,1

1301 D1$="U4E2R1U4E1U2H1L1H1U1H1
U1E1U1E1R1E1U1E1D1F1E1U1F1D1F1R1
F1D1F1D1G1D1G1L1G1D2F1D4R1F2D4L1
2":DRAW"C1S16BM156,160;XD1$;"

3001 GET(20,90)-(46,105),A1,G:CO
LOR1,0:LINE(20,90)-(46,105),PRES
ET,BF

3011 PAINT(40,55),,1:COLOR1,0:CI
RCLE(20,58),4,1:CIRCLE(32,58),4,
1:CIRCLE(52,58),4,1

3029 LINE(102,19)-(106,24),PRESE
T:PMODE4,5:COLOR1,0

3053 LINE(X,Y)-(X+8,Y),PSET:X=X-
2:NEXTY:COLOR2,1:FORX=218TO234ST
EP4:PSET(X,17):NEXTX

3101 FORX=120TO130STEP4:PSET(X,4
7):PSET(X,48):NEXTX:D2$="E2R1F2G
2L1H2"

3143 PAINT(95,34),,1:PMODE3,5:CO
LOR2,1:LINE(94,33)-(256,64),PSET
,B

3163 PMODE3,5:COLOR3,1:LINE(12,1
02)-(64,102),PSET

3221 PMODE4,5:POKE178,1:PAINT(11
0,79),,1:PMODE3,5:DRAW"S16BM102,
90;XD2$;"

3247 PMODE3,5:DRAW"C3S12BM24,120
;XD4$;":PAINT(28,116),3,3

3301 PAINT(100,41),,1:COLOR1,0

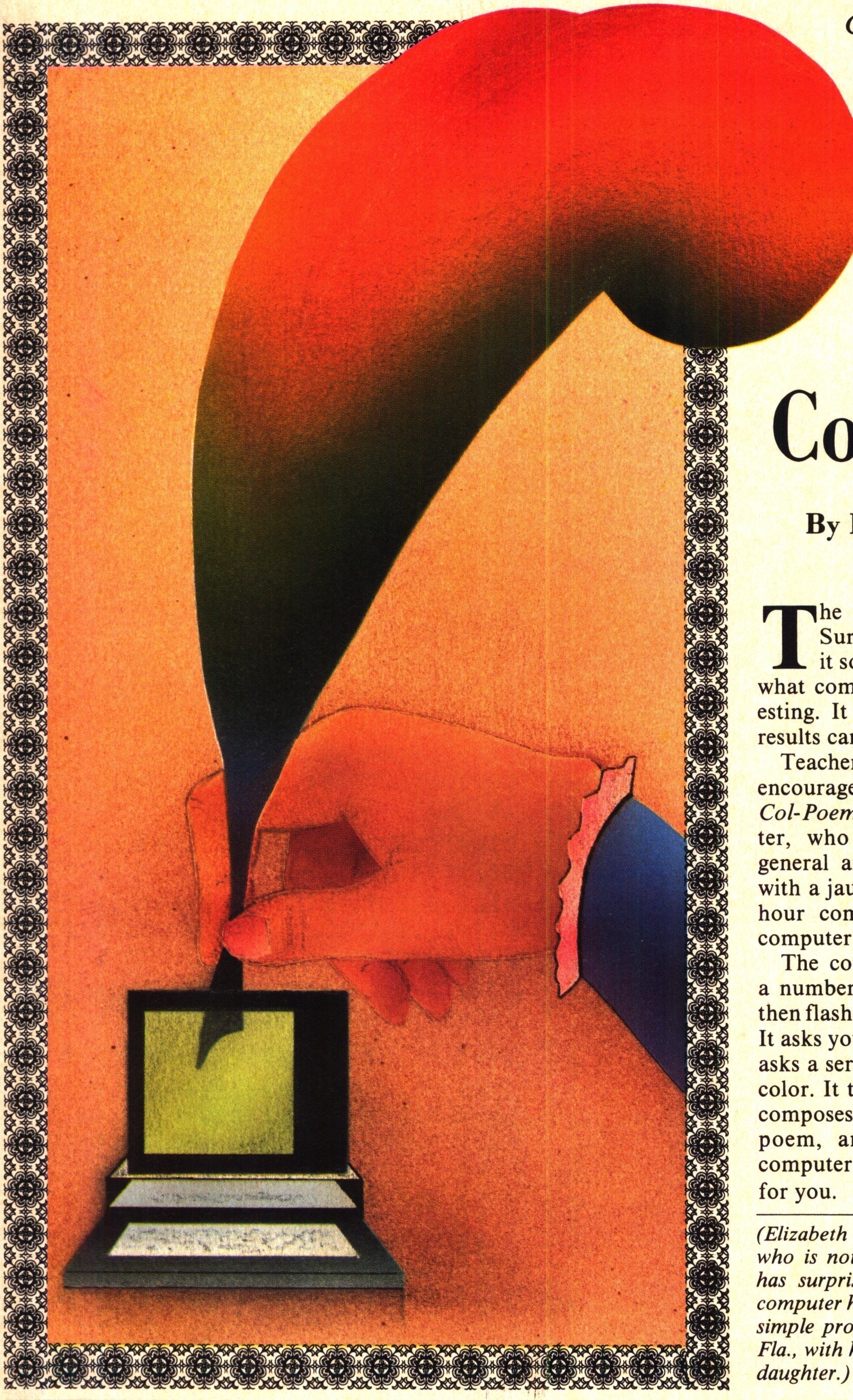
3317 DRAW"BM"+STR$(X)+",48;XD1$;
BM"+STR$(X)+",68;XD2$;":NEXTX:LI
NE(129,39)-(255,77),PRESET,BF:RE
TURN

6906 GOSUB6300:GOTO7000

7906 FORI=1TO30:PRESET(RND(255),
161+RND(7)):NEXTI:GOSUB6500

9501 PRINT:PRINT"BONUS 2000!!!":
S1=S1+2000:FORI=1TO800:NEXTI

9901 PRINT@227,"PRESS <ENTER> TO
 CONTINUE"
```



Combined with some rhyme and reason and a little inspiration from you, CoCo will be an aesthetic composer

CoCo-etry

By Elizabeth Ligon

The computer write poetry? Sure it can! You have to feed it some words, of course, and what comes out can be very interesting. It may not rhyme, but the results can be very pleasant.

Teachers or parents who wish to encourage creative writing will find *Col-Poem* very helpful. My daughter, who looks upon writing in general and computers in specific with a jaundiced eye, will spend an hour composing poems with the computer's help.

The computer asks you to pick a number from zero to eight, and then flashes that color on the screen. It asks you what color you see, then asks a series of questions about the color. It takes your statements and composes a poem. If you like the poem, and have a printer, the computer will even print the poem for you.

(Elizabeth Ligon, a reading professor who is not at all technically inclined, has surprised herself by becoming a computer hacker and enjoys making up simple programs. She lives in Miami, Fla., with her husband and 11-year-old daughter.)

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Col-Poem is simple enough for the person new to computers and who doesn't have Extended Color BASIC. Those with Extended Color can change the input commands in lines 190-220 to line input commands, thus allowing for punctuation. Additionally, the printing commands (lines 415 to 510) can be changed to fit your printing needs.

Run the program and see what happens. You may find, with CoCo's help, that you have some poetic talents!

(Any questions concerning *Col-Poem* can be directed to Ms. Ligon at 16501 SW 102 Place, Miami, FL 33157. Please include a SASE.)

230 207
END 9

The listing: COL-POEM

```
10 CLS (0)
20 '***"COL-POEM"***
30 '***BY ELIZABETH LIGON***
40 PRINT @96,"      COLOR POEMS"
50 PRINT
60 PRINT "THE COMPUTER WILL HELP
 YOU COM- POSE A COLOR WORD PICT
URE. ANS- WER EVERY QUESTION AS
BEST YOU  CAN."
70 PRINT
80 PRINT "USE NO PUNCTUATION."
90 PRINT
100 PRINT"KEEP YOUR ANSWER TO ON
E LINE."
110 PRINT
120 INPUT "CHOOSE A NUMBER BETWE
EN O AND 8";CO
130 IF CO>8 THEN GOTO 120
140 CLS (CO)
150 INPUT "WHAT COLOR DO YOU SEE
?";A$
160 PRINT "WHAT DOES "A$" MAKE Y
OU THINK   OF?"
170 INPUT B$
180 PRINT B$ " IS/ARE DOING WHAT
?"
190 INPUT C$
200 INPUT "HOW";D$
210 INPUT "WHEN";E$
220 INPUT "WHERE";F$
230 CLS(CO)
240 PRINT @224, " HERE IS YOUR P
OEM"
250 FOR X=1 TO 1000:NEXT X
260 CLS (CO)
270 PRINT @64, A$
280 PRINT
290 PRINT A$ " IS LIKE "
300 PRINT B$
310 PRINT E$
320 PRINT F$
330 PRINT C$
340 PRINT D$
350 PRINT
360 INPUT "DO YOU WANT TO PRINT
YOUR POEM? (Y/N) ";AN$
370 IF AN$="N" THEN 520
380 PRINT "WHAT IS YOUR NAME?"
390 INPUT N$
400 CLS:PRINT "GET YOUR PRINTER
READY. PRESS   enter WHEN READY.
"
410 INPUT EN$
415 PRINT #-2, CHR$(27) CHR$(19)
420 CLS: PRINT #-2, A$
430 PRINT #-2, CHR$(26)
440 PRINT #-2, A$;" IS LIKE "
450 PRINT #-2, B$
460 PRINT #-2, E$
470 PRINT #-2, F$
480 PRINT #-2, C$
490 PRINT #-2, D$
500 PRINT #-2, CHR$(26)
510 PRINT #-2, "BY ";N$
520 INPUT "DO YOU WANT TO DO ANO
THER POEM  (Y/N) ";AN$
530 IF AN$="Y" THEN 120 ELSE END
```

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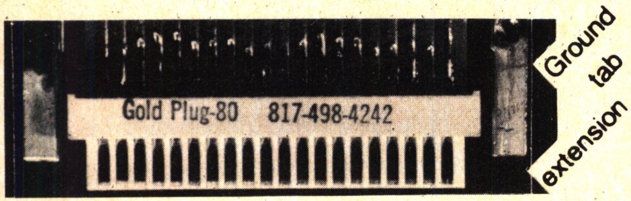

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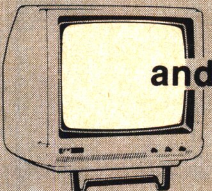

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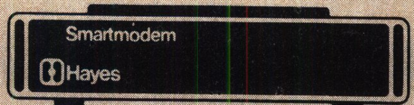

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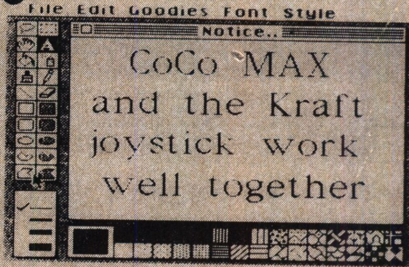

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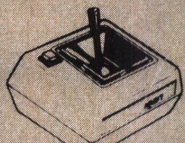

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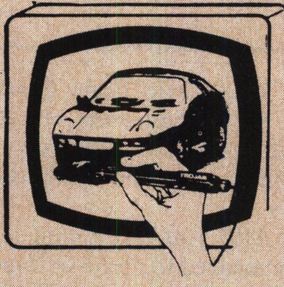

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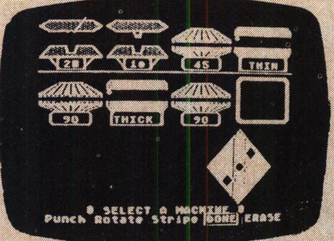

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TAKING BASIC TRAINING

16K ECB

Sprucing Up An Old Design

By Joseph Kolar
Rainbow Contributing Editor

The last time around, we delved into the little used 'A' option and developed an interesting symmetrical creation using only one design element. In order to make the resulting display even more interesting, we are going to use the same old design unit to add a bit more pizazz to what we created.

Without further ado, we will continue where we left off. If you `CSAVE`d Listing 2, `CLOAD` it and change Line 0 to read Listing 1. Place `REM` markers in front of lines 30, 50 and 60. If you didn't save the listing or want to start from scratch, key in lines 0 through 60 and 500.

We are going to create essentially the same design we made last month. Geometrically, it is impossible to make this new element identical to our original design unit. It will be a close approximation.

The difference is due to its orientation. The original A$ (horizontal orientation) radiated left from the initial starting point. The four 'A' options created a cross. Today, the orientation will be on the diagonal, up and to the left from the starting point, and the four 'A' options will create an 'X,' so get out the old graph paper (see Figure 1).

The length of the original design unit, A$, was 28 boxes (units) wide. (You can count it by tracing out the design in Line 20 on graph paper.) Rule a line 28 units long on the bottom of a clean sheet of graph paper. Mark the right-hand end with a prominent star and label this line "BOTTOM." From the star, rule a line 28 units up; label this line "RIGHT." From there, rule a line 28 units to the left and label it "TOP." Label the unruled side "LEFT."

Rule a diagonal line from the star to the left end of the TOP line. This diagonal line is the center line of your new design unit.

Rotate the sheet of graph paper to the left so the LEFT-BOTTOM corner points at you. Using the reliable data in Line 20, beginning at the point of origin (star), trace out the shape with a heavy pencil. Remember, you are creating the same shaped design but from the right instead of the left. Note that the line that would be U2 in the horizontal design is now H2 in the diagonal rendition.

You would begin like this: up and to the left two units, H2; left two units, L2; down and to the left six units, G6. Finish it up and compare it with Line 20.

After you have completed it, you may be amazed to discover that even though you faithfully followed the directional instructions in Line 20, the design's area is much smaller. To give it relatively the same shape, we lost eight units somewhere. Don't fret! It is the shape we want to replicate. The fact that it is smaller will only enhance our final creation.

Reorient the graph paper so the BOTTOM is (guess where) at the bottom. Look at Line 70, C$. Trace out the directions and see what you have wrought. Rotate the graph paper so RIGHT is now at the bottom. Again, trace it out, using the information in Line 75, D$, as a guide. Now flip it so TOP is on the bottom. Remember, we always begin at the point of origin (star). Look at Line 76, E$, and trace it out, then rotate once more so LEFT is on the bottom and trace out Line 77, F$.

These four program lines, 70, 75, 76 and 77, create a near-clone to A$ in four different orientations, radiating in

---

(Joseph Kolar is a free-lance writer and programmer dedicated to proselytizing for computers in general, and the CoCo specifically.)

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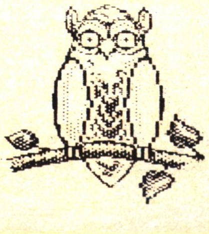

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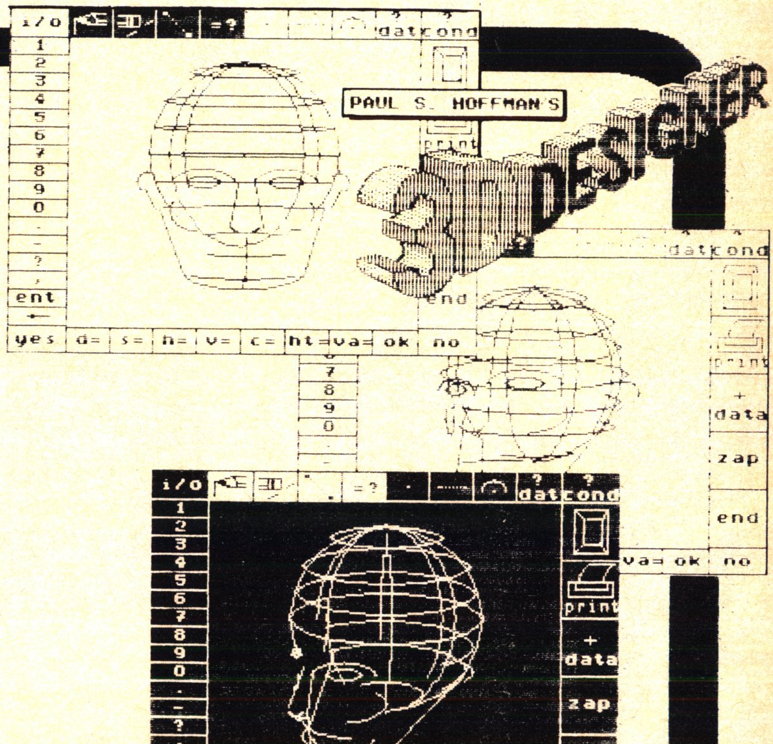

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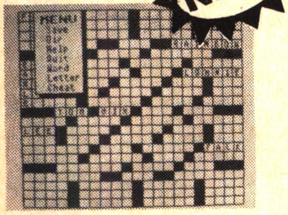

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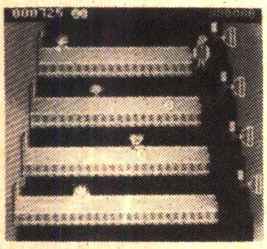

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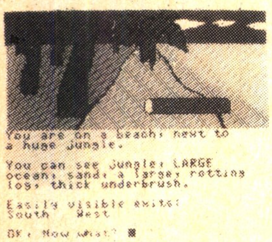

```
You are on a beach, next to
a huge jungle.

You can see Jungle, LARGE
ocean, sand, a large, rotting
log, thick underbrush.

Easily visible exits:
South   West

OK, Now what?
```

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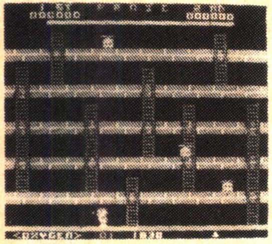

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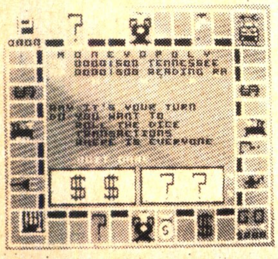

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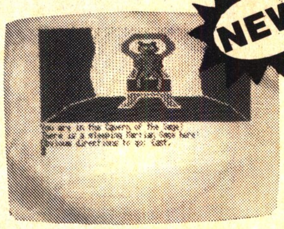

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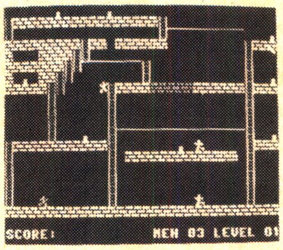

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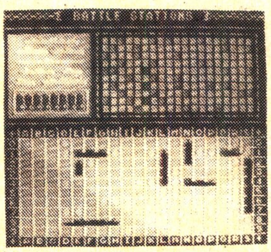

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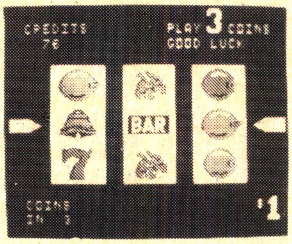

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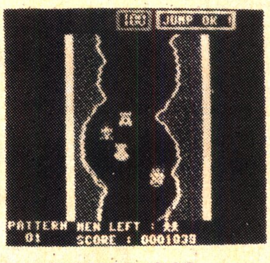

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the four diagonal directions from a central point.

Key in the four lines and Line 88. Note Line 88: Among the instructions to CoCo, you will see BH3. Without BH3, the element would butt right up to the central point. It would look crowded and become indistinct. One solution is to back off from the jammed-up central point by three units in the direction of the radiation. Type `RUN` and press BREAK.

To see this better, temporarily key in cross hairs: `85 DRAW"BM0,96R128NR128NU96D96"` and `RUN`. Press BREAK; key in and check lines 90, 91 and 92 one at a time.

Then, if you want to see the four units butt up to the central point, remove the back-off instructions in each of the four lines: BH3 from Line 88; BE3 from 90; BF3 from 91; and BG3 from 92 and `RUN`. See?

Note that these four lines all used A0 because they were placing the four differently oriented elements: C$, D$, E$ and F$.

Press BREAK and place a `REM` marker in front of lines 88, 90, 91 and 92 to deactivate them.

Key in Line 80. This time, C$ will be put through its entire cycle of 'A' options. The results are the same. `RUN` to check it out and press BREAK.

Delete Line 85 and remove the `REM` marker in lines 88, 90, 91 and 92, and `RUN`. You got an interesting design! Now hit the BREAK key.

Replace the back-off elements: BH3 in Line 88; BE3 in 90; BF3 in 91; and BG3 in 92 and `RUN`.

What happened? Backing off three units placed the elements over the ones drawn by Line 80, C$. Which is better? Drawing four separate orientations with all the attendant problems and placing each individually on the display, or drawing one orientation and rotating it, using the 'A' option, through the four orientations?

Press BREAK and while we are at it, change S8 to S4 in Line 88; `RUN` it and hit BREAK. Now, change S4 to S12 in Line 88. `RUN` it and press BREAK, and change it back to S8.

Key in Line 81. This effectively keeps out the superimposed design elements. We may want to call on them later.

You have glimpsed designs that were created with these overlapping and rotated elements. What do you say to adding some of the designs we developed last time? Take the `REM` marker out of Line 30 and `RUN`.

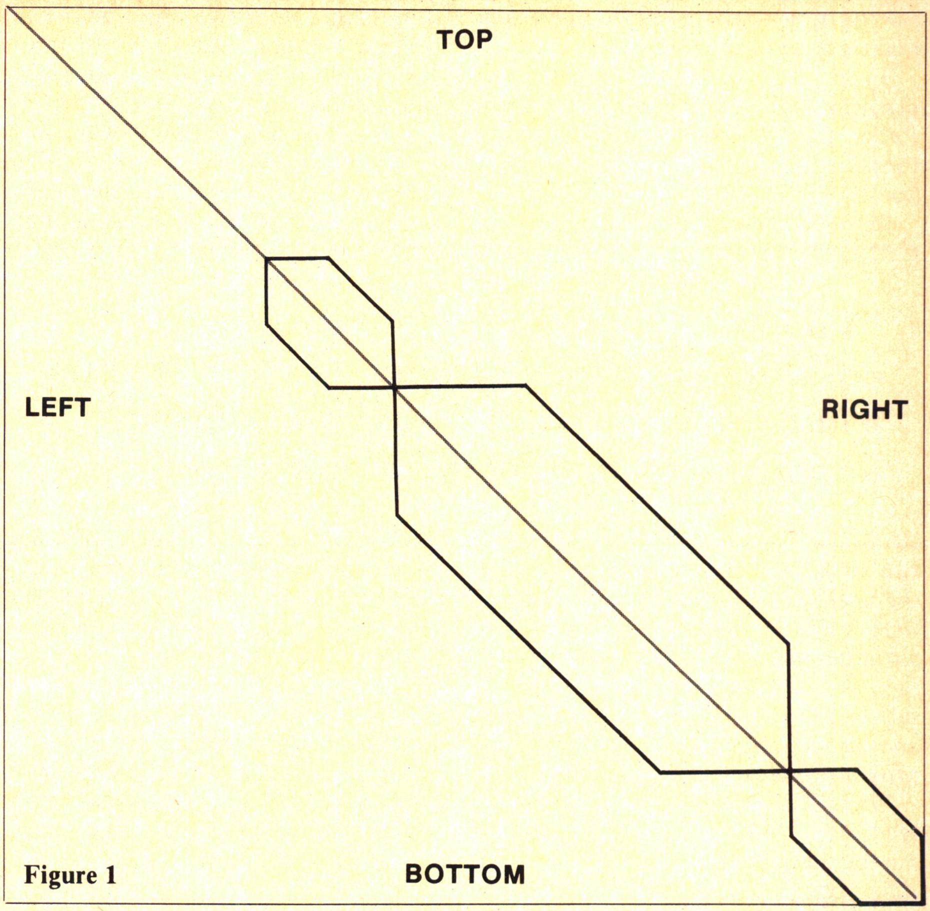

Figure 1

Do you see why we backed off three units from the central point? No? Press BREAK, take the `REM` marker out of Line 60 and `RUN`. See how jammed up it is in the middle?

For the heck of it, BREAK and put a `REM` marker in Line 81. In Line 88, change BH3 to BH12 and `RUN`. If you like what you see, BREAK and change BE3 to BE12 in 90, BF3 to BF12 in 91 and BG3 to BG12 in 92 and `RUN`.

Move these four design units back and forth along the center line by increasing or decreasing the numerical value in the 'B' back-off instructions. Experiment! You may want to try your hand at creating your own designs. Go to it and see what you can create. It will be original and afford you a lot of satisfaction.

Now, back to basics! Most beginners own a cassette-based CoCo. From personal experience, I have determined that so-called computer grade cassette tapes are not much better than cheap 60-minute tapes. Both are equally unreliable, sad to say, and full of faults that cause I/O errors to the consternation of beginners who are valiantly attempting to `CSAVE` their first efforts in programming.

This is of vital concern to beginners who, compelled to wade through new concepts and complex procedures, want a copy of their hard-earned work. For them to lose the fruits of their first programming efforts, due to faulty tapes, is truly tragic because they may be unable to duplicate their original work. Faults in the oxide coating of a cassette tape are like dormant booby traps which reveal themselves as I/O error messages when the program is `CLOAD`ed.

Here are some hints on how to attack this vexing problem:

— Always use program Line 0 of your listings as a `REM` line, reserved for the title of the program, (i.e., `0 'PICTURE`).

— Expect to make three copies of every listing, working or completed, that you value. No matter what brand of tape I use, it seems that at about 012 to 016 (using CTR-80A cassette counter numbers) there is a tendency to generate I/O error messages due to some fault in the tape.

For example, you have a program in memory and insert a fresh cassette, sides properly identified, into your recorder. Fast forward the tape to about 20 counter numbers to take up any slack, then rewind to the beginning. Set the counter to 000. Fast forward to a safe starting location, say about 020 and make a note of the number.

Type `LIST0`; the name of your program will appear on the screen. Press the Record and Play buttons on the cassette recorder. Key in `CSAVE"PICTURE"`.

Before you press ENTER, compare the two lines on the screen to make sure the spelling is correct. This is a good time to stop and think, "Is this a variation and does it need a new title?" (i.e., `0 'PICTUREA`). When you are satisfied that it is the correct spelling and correct name of the version of the program you are saving, press ENTER.

> ***"You may want to try your hand at creating your own designs. Go to it and see what you can create. It will be original and afford you a lot of satisfaction."***

When it is `CSAVE`d, press Stop on the recorder. Copy the ending counter number, say 025. Rewind the recorder to at least one or two digits before the starting number, which you previously copied. Press the Play button on the recorder, key in `SKIPF` and ENTER.

If you have a good `CSAVE`, CoCo will search for 'S' on the screen; find the program *F PICTURE* and after passing through it, "OK" will appear on the screen and the recorder will stop; press the Stop button. Advance about 005-010 counter units to locate for your next `CSAVE`.

If there is a fault, you may or may not reach *F PICTURE* before getting an I/O Error; you might get it on 'S'. You will get the dreaded ?IO Error with OK underneath. The recorder will stop. Now press Stop. A glance at the counter will tell you where the error occurred — say 022. I usually make a notation of this on my cassette file card (i.e., I/O 22 — 20 PICTURE 25).

You never know when you might erase and reuse a tape. There is not much sense in `CSAVE`ing over a bad spot.

Advance the recorder about 005-010 units after the unsuccessful `CSAVE` and try again. Use this procedure until you have three good copies.

If you have an especially valuable listing, even though `SKIPF` indicates a good copy, rewind to a counter location in front of the beginning of the first `CSAVE` and run through the `SKIPF` procedure again before taking the listing out of memory with `NEW` or turning off CoCo.

Sometimes on `CLOAD`ing a program, you may get an I/O, but if you go back, type `NEW` or press Reset and try again, then you may get a good `CLOAD`.

At other times, when `CLOAD`ing you may get an I/O Error while searching. The chances are good that you might be past the beginning of the program and drive CoCo nuts. Back off a few counter units and try again.

The last result is also possible when

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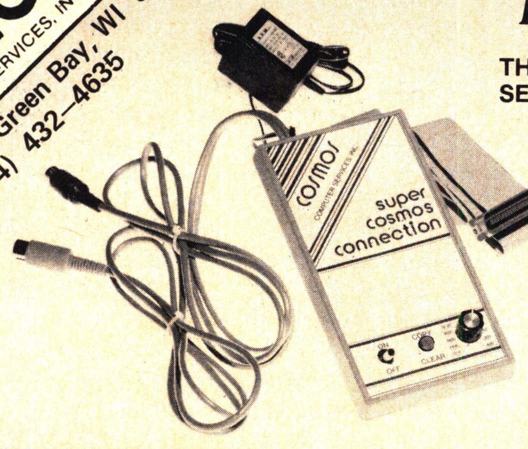

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you failed to reset the counter to 000 after rewinding to the beginning.

An alternative system is to CSAVE three copies in succession with appropriate gaps between copies. Rewind in front of the first copy, then type SKIPF and ENTER. When the cassette stops and a good copy is indicated by OK, just type SKIPF and ENTER without stopping the recorder. After passing through the blank area, it will pick up the second copy and stop at the end. Again, if it is OK type SKIPF and ENTER, and continue until you get an OK after the third copy.

This is no guarantee that you will always get good CSAVEs or CLOADs because "spikes" might occur and short-circuit your efforts, but you can make a prudent attempt to record your important programs and keep losses to a minimum.

Listing 1: BASTRAIN

```
0 'LISTING1
5 CLEAR500
10 PMODE4,1:PCLS:SCREEN1,1
20 A$="H2L2G6L8H6L2G2F2R2E6R8F6R
2E2"
30 'DRAW"S4A0BM128,96"+A$+"A1"+A
$+"A2"+A$+"A3"+A$
50 'DRAW"S12A0BM128,96"+A$+"A1"+
A$+"A2"+A$+"A3"+A$
60 'DRAW"S8A0BM128,96"+A$+"A1"+A
$+"A2"+A$+"A3"+A$
70 C$="U2H2L6H8U6H2L2D2F2R6F8D6F
2R2"
75 D$="U2E2R6E8U6E2R2D2G2L6G8D6G
2L2"'ORIENTATION RIGHT SIDE
76 E$="R2F2D6F8R6F2D2L2H2U6H8L6H
2U2"'ORIENTATION TOP
77 F$="L2G2D6G8L6G2D2R2E2U6E8R6E
2U2"'ORIENTATATION LEFT SIDE
80 DRAW"A0S8BM128,96BH3"+C$:DRAW
"A1BM128,96BH3"+C$:DRAW"A2BM128,
96BH3"+C$:DRAW"A3BM128,96BH3"+C$
81 GOTO81
88 DRAW"S8A0BM128,96BH3"+C$
90 DRAW"A0BM128,96BE3"+D$
91 DRAW"A0BM128,96BF3"+E$
92 DRAW"A0BM128,96BG3"+F$
500 GOTO500
```

Listing 2: ZIP

```
0 'ZIP
10 '(C) 1984, J. KOLAR
30 PMODE3:PCLS:PMODE4
40 A=84:B=76:R=76
50 DIM S(7),T(7)
60 CIRCLE(8,8),8,1:CIRCLE(7,7),8
,1
61 DRAW"BM8,8BL3UER2FD2GL2HU"
70 GET(0,0)-(16,16),S,G
72 CIRCLE(38,8),5,1:PAINT(40,8),
1,1
73 GET (30,0)-(46,16),T,G
80 PCLS:SCREEN1,1
100 FORZ=-200TO-187.5 STEP+.5:C=
Z
115 K=C-1.74*R^2
120 X=INT(A+R*SIN(K+.9)):Y=INT(B
+R*COS(C-.95))
130 PUT(X+36,Y+10)-(X+52,Y+26),S
,OR
135 PUT(X+36,Y+10)-(X+52,Y+26),T
,AND:SOUND100,1
140 X=INT(A+R*SIN(C)):Y=INT(B+R*
COS(K))
150 PUT(X+36,Y+8)-(X+52,Y+24),S,
 OR
155 PUT(X+36,Y+8)-(X+52,Y+24),T,
AND:SOUND100,1
160 NEXT Z
170 PLAY"V20O3L8CL4EL8CO2AABBO3C
CL8CL4EL8CP4V25O2L8CL4EL8CO1AABB
O2CCL8CL4EL8CP4V20O2L8EL4GL8EO1B
BO2CCDDL8EL4FL8CL4DL2C":PCLS:GOT
O100
```

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SCHOOL IS IN THE HEART OF A CHILD

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Making Your Own Mandala*

*Guaranteed Not To Melt!

By Bob Albrecht and Ramon Zamora
Rainbow Contributing Editors

"School Is In The Heart Of A Child" is for parents of quite young children. We want to help you work and play with your 3- to 8-year-old child and learn to use computers as a joyful family experience. We suggest ways to use the home computer as another means to encourage your child's independence, growth and control over her own life. See the pride on her face as she directs the computer to do what she selects with deliberation. See her head gears switch to "on" as she progresses step by step with your presence and caring guidance. We will explore (we hope, with your help) the following:

- Specific "teaching" techniques so the discovery can be the child's own.
- Critical evaluation of software based on extensive playtesting in family and related environments.
- Additional resources to consult: books, magazines, software publishers, networks, etc.
- Suggestions for interludes and fun times away from the computer (a must!): call the librarian for information; watch TV together and discuss it; work together as volunteers in a community project; take an "awareness" walk.
- Whatever we learn from families we work with in Menlo Park or from you, our readers. Let's pool our knowledge and share our experiences as we learn from our children.

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(Well-known author Bob Albrecht has written numerous articles and books on personal computers through his association with DragonQuest. Ramon Zamora is author and co-author of several books, co-founder of Computer Town USA!, and is currently designing computer games for kids at Child Ware Corp. in Menlo Park, Calif.)

A mandala is a symmetrical pattern and nice to look at. A snowflake is beautifully symmetric about its center. Snowflakes are great mandalas but melt all too soon. Use this program to make your own mandala. Each time you press two letter keys, one at a time, the CoCo will put four color blips on the screen, arranged symmetrically about the center of the screen. The color is selected randomly.

Listing 1: MANDALA

```
100 REM**MAKE A MANDALA SCH 17-1
110 CLS 0
199 '
200 REM**GET TWO LETTERS
210 H$=INKEY$:IF H$="" THEN 210
220 IF H$<"A" OR H$>"Z" THEN 210
230 V$=INKEY$:IF V$="" THEN 230
240 IF V$<"A" OR V$>"Z" THEN 230
299 '
300 REM**COMPUTE OFFSETS +COLOR
310 H = ASC(H$) - 65
320 V = ASC(V$) -65
330 V = INT(V/2)
340 KOLOR = RND(8)
399 '
400 REM**TURN ON 4 BLIPS
```

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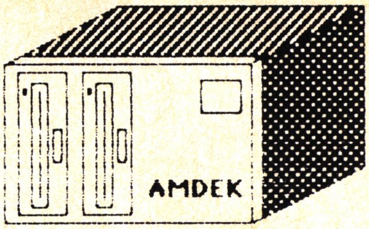

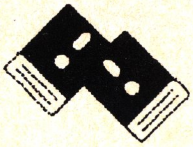

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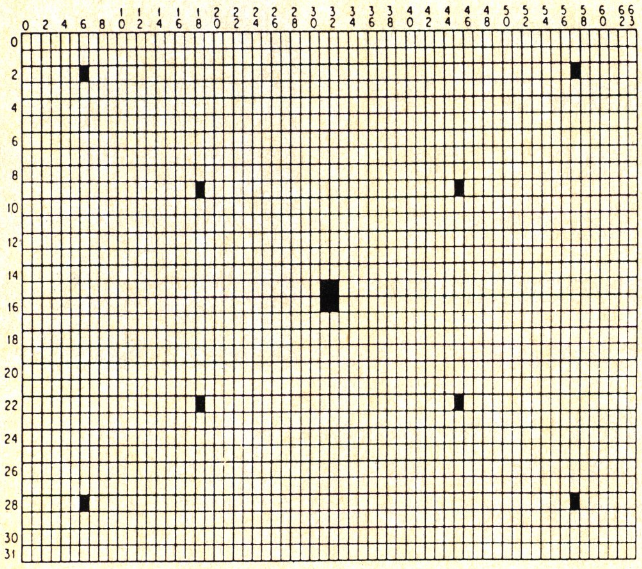
```
410 SET(31 - H, 15 - V, KOLOR)
420 SET(31 - H, 16 + V, KOLOR)
430 SET(32 + H, 15 - V, KOLOR)
440 SET(32 + H, 16 + V, KOLOR)
499 '
500 REM**GO FOR MORE LETTERS
510 GOTO 210
```

Enter and run the program. You see an empty black screen (Line 110). The CoCo waits for someone to press a letter key as the value of H$ (lines 210 and 220). After someone does this, the CoCo then waits for a second letter as the value of V$ (lines 230 and 240). Make sure CoCo is in uppercase mode — characters that are not uppercase letters are ignored.

Suppose a child presses two letter keys. The CoCo now goes on to block 300. Line 310 computes the value of 'H,' the horizontal offset. This is how far to the left and right of center the blips will appear, zero for 'A,' one for 'B,' two for 'C,' and so on up to 25 for 'Z.' Lines 320 and 330 compute the value of 'V,' the vertical offset. This is how far above or below center the blips will appear. The value of 'V' will be zero for 'A' or 'B,' one for 'C' or 'D,' two for 'E' or 'F,' and so on, up to 12 for 'Y' or 'Z.' Line 340 computes one random color for all four blips.

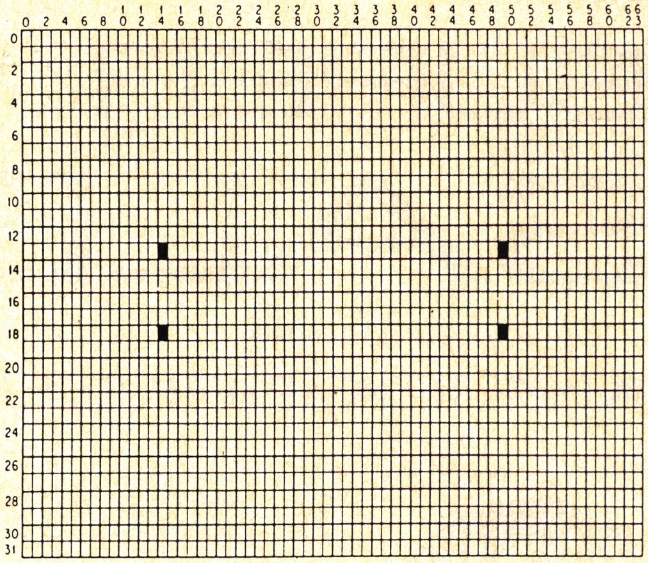
On to block 400, which turns on the four blips. Here is a screen map showing blips if you press AA, MM and ZZ. The blips for AA are closest to the center of the screen and the blips for ZZ the farthest from the center.

Pattern 1


0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 63
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 31

Pattern 1 appears if you press the same key for both letters. Here is what happens if you press 'R' as the first letter and 'E' as the second letter.

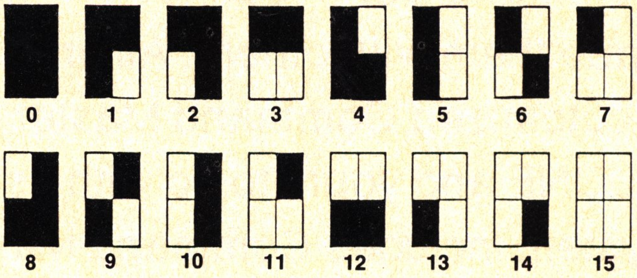
Pattern 2


0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 63
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 31

Of course, let your child discover these things by pressing keys. Soon she will be able to make mandalas that please her!

Graphics Characters

ASCII codes 128 to 255 are graphics characters. Each graphics character occupies one print position. A graphics character is a simple shape in black plus one color. There are 16 distinct shapes, numbered zero to 15, shown here in black and white. Substitute any color (one to eight) for white.


0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

Color the above 16 characters green. These are ASCII graphics characters 128 to 143. Color the above characters yellow. You now have graphics characters 144 to 159 — and so on, as shown by the following table.

Color	ASCII Codes
Green	128 to 143
Yellow	144 to 159
Blue	160 to 175
Red	176 to 191
Buff	192 to 207
Cyan	208 to 223
Magenta	224 to 239
Orange	240 to 255

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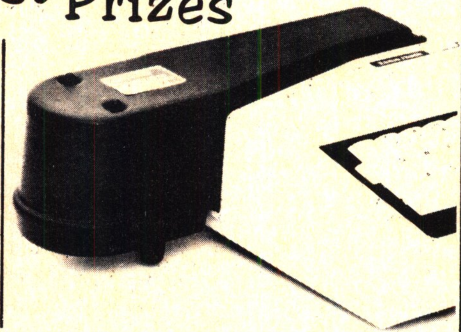

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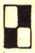
Or, compute the ASCII code as follows:

1) Pick a SHAPE, zero to 15.
2) Pick a KOLOR, one to eight.

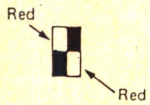
Compute the ASCII Graphics Code (GC), as follows:

GS = 128 + SHAPE + 16*(KOLOR – 1)

For example,
Pick a SHAPE:  This is SHAPE = 9.

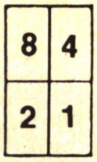
Pick a KOLOR. Choose red. KOLOR = 4.
GC = 128 + 9 + 16*(4 – 1) = 185

Try it. Type `PRINT CHR$(185)` and press ENTER.



In case you haven't memorized the shapes and their numbers, don't bother. Here is an easy way to compute shape numbers.

Remember this:



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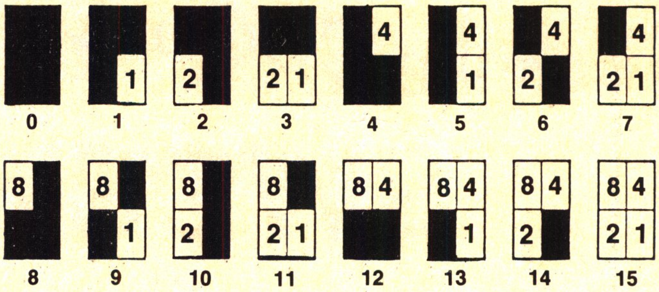
Here are shapes zero through 15.



Got it? If not, note that 3 = 2 + 1, 5 = 4 + 1, and 7 = 4 + 2 + 1. That's right, just add up the numbers in the blocks that aren't black.

Use the following program to put graphics characters on the screen. Try to build some pictures. Use a screen map to help you decide where to put each graphics character. You are working on a black screen.

Listing 2: SHAPEMKR

```
100 REM**SHAPE MAKER SCH 17-2
105 REM**FROM TRS-80 COLOR BASIC
110 CLS 0
199 '
200 REM**TALK TO SHAPE MAKER
210 PRINT @0, "": PRINT @0,;
220 INPUT "SHAPE (0 TO 15)"; S
230 PRINT @0, "": PRINT @0,;
240 INPUT "COLOR (1 TO 8)"; C
250 PRINT @0, "": PRINT @0,;
260 INPUT "WHERE (32 TO 510)"; S
P
299 '
300 REM**PRINT GRAPH CHARACTER
310 GC = 128 + S + 16*(C - 1)
320 PRINT @SP, CHR$(GC);
399 '
400 REM**SOUND OFF + GO AROUND
410 SOUND 89, 1: SOUND 89, 1
420 GOTO 210
```

Listen and Guess My Number

Ready for a guessing game? The CoCo "thinks" of a number. You guess, then listen. The computer plays a tone. High tone means you are far away; low tone means you are close. The lower the tone, the closer you are to the computer's secret number.

Listing 3: LISGUESS

```
100 REM**LISTEN & GUESS SCH 17-3
105 REM**FROM TRS-80 COLOR BASIC
110 LO = 1
120 HI = 255
199 '
200 REM**TELL HOW TO PLAY
```

```
210 CLS
220 PRINT "I'LL THINK OF A NUMBE
R"
230 PRINT "FROM " LO "TO" HI "."
240 PRINT
250 PRINT "GUESS MY NUMBER, THEN
 LISTEN."
260 PRINT "HIGH TONE MEANS FAR A
WAY."
270 PRINT "LOW TONE MEANS YOU AR
E CLOSE."
299 '
300 REM**COCO 'THINKS' OF NUMBER
310 N = RND(HI-LO+1) + (LO-1)
399 '
400 REM**GET A GUESS
410 PRINT
420 INPUT "YOUR GUESS"; G
499 '
500 REM**D IS DISTANCE FROM N
510 D = ABS(N-G)
599 '
600 REM**CHECK FOR A WIN
610 IF D=0 THEN 810
699 '
700 REM**NO WIN, SOUND HINT
710 IF D>255 THEN SOUND 255, 30:
 GOTO 410
720 SOUND D, 30: GOTO 410
799 '
800 REM**WINNER!
810 PRINT "CONGRATULATIONS! YOU
GOT IT."
899 '
900 REM**CRAZY 'MUSIC' PLAY AGAI
N
910 FOR Z=1 TO 100
920 : SOUND RND(255), 1
930 NEXT Z
940 GOTO 210
```

The range of possible numbers is set by lines 110 and 120. For younger children, you may want to change `HI` to a smaller number. For older kids, try various combinations of `LO` and `HI`.

Number Patterns, One More Time

Last time, we challenged you to write the final number patterns program. Here is our version.

Listing 4: `NMBRPTRN`

```
100 REM**NMBR PATTERNS SCH 17-4
110 CLS
120 PRINT "TRY SOME NUMBER PATTE
RNS.": PRINT
130 PRINT "PRESS THE spacebar TO
 BEGIN."
140 IF INKEY$="" THEN 140
199 '
200 REM**READ STARTING NUMBERS
210 CLS
220 READ S, M, A, B
230 IF S = 1E37 THEN PRINT "I,M
OUT OF PATTERNS" : END
299 '
300 REM**SHOW 'LATEST' NUMBER
310 PRINT @448, S
320 PRINT
399 '
400 REM**COMPUTE NEXT NUMBER
410 S = M*(S+A) + B
499 '
500 REM**WHAT TO DO NEXT
510 PRINT @480, "FOR NEXT NUMBER
, PRESS spacebar"
520 PRINT "FOR NEW PATTERN PRESS
 clear";
530 K$=INKEY$:IF K$="" THEN 530
540 IF K$=" " THEN 310
550 IF K$=CHR$(12) THEN 110
ELSE 530
599 '
900 REM**VALUES OF S, M, A, B
910 DATA 1, 1, 1, 0
920 DATA 1, 1, 0, 1
930 DATA 1, 1, 2, 0
940 DATA 1, 1, 0, 2
950 DATA 2, 1, 2, 0
960 DATA 2, 1, 0, 2
970 DATA 2, 1, 3, 0
980 DATA 1, 2, 0, 0
990 DATA 11, 10, 0, 1
1000 DATA 32, 10, 1, 2
1010 DATA 34, 10, -1, 4
1020 DATA 1, -2, 0, 0
1030 DATA 1E37, 1E37, 1E37, 1E37
```

DragonSmoke* and *DragonFun

DragonSmoke is our newsletter about new ways to learn, including computers, role playing games, play-by-mail games, COPY ME stuff, public domain instructional materials, software for beginners, and our own play-by-mail game, *DragonFun*

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DragonSmoke has become too big to stuff into self-addressed, stamped envelopes. For a sample copy, send $1 to *DragonSmoke*, P.O. Box 7627, Menlo Park, CA 94026.

Building A Spreadsheet With Template Repetition

By Richard A. White
Rainbow Contributing Editor

The basic simplicity of spreadsheeting is brought home in a new book, *1-2-3 from A to Z*, by Elna Tymes and Tony Dowden (Hayden Books, 1985). This book includes 59 complete templates for *Lotus 1-2-3*. With a few possible exceptions which I have not yet found, the templates will go directly into *DynaCalc* or *VIP Calc*. Some will also run in *Elite*Calc* with minor syntax changes.

Many of these are very simple examples consisting of making lists and finding subtotals and final totals. The next order of complexity deals with interest calculations which are not much more than multiplication. @IF( ) is used a lot in some sheets, @SUM( ) shows up frequently, @AVG( ) less so and @NPV( ) very infrequently. Divisions show up frequently since a lot of time can be spent looking for usage per time period averaged over a certain period, or average cost per item when total manufacturing costs are known. Still, none of this is particularly complicated.

A problem I have is finding spreadsheet tasks that even start to challenge the capabilities of spreadsheet programs. A finite element analysis of the stresses and deflections in a flat plate secured at two sides and loaded in the center might do. But, I just don't have any need for that information today and doubt that many of you do, either. Repetition of simple structures characterizes most spreadsheets.

(Richard White has a long background with microcomputers and specializes in BASIC *programming. With Don Dollberg, he is the author of the* TIMS *database management program.)*

We have talked in previous columns about REPLICATE and COPY commands. These work wonders in building the basic spreadsheet. Now, think about repeating your basic template a number of times in a single spreadsheet. It's not hard, but it does raise a point to think about that we have not touched on before. For an example, let's do some ordinary tax deduction figuring.

How many of you save your sales slips so you can total your sales tax for the year to deduct from your income tax? All that tax needs to be added up sometime, so let's do it in a semi-organized way. We could take each sales slip off the pile, write down the tax and put it on another pile, then add up all the numbers. Or, we could build a budgeting spreadsheet where each purchase is categorized and entered in its category. The program then might calculate monthly subtotals by category, compare these to the budget amounts and show where we are over or under budget. Plus, this data helps in establishing future budgets.

I have real problems with this. My computer budget would have to be negotiated with my wife who is not particularly pro-computer. On the other hand, I am anti-garden mulch which causes her problems. She does not tell me how many bags of mulch she buys and I say very little about the new disk drives.

An intermediate approach is to organize the data just enough in a spreadsheet to impress the IRS (if needed) and say that's enough. I decided to group the data by month with subtotals and then get a year-end total. To be able to check the entries, the date would be needed and a brief purchase description. Curiosity got the better of me, so I included a total sale column.

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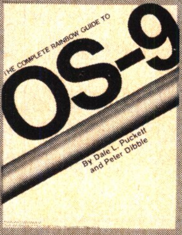
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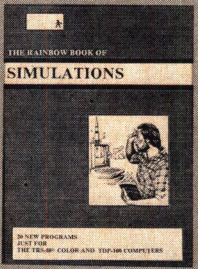

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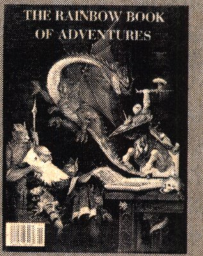

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The strategy will be to build a template for one month within one high resolution display screen. *Elite*Calc* fans will need Version 3.0. We will then duplicate this monthly template a number of times to get half a year into a single spreadsheet.

Why only half a year? There are only 255 rows available in *Elite*Calc* and *DynaCalc*. Fifty of these would be tied up with monthly headings and totals. If you are going to save money by itemizing your sales taxes, you will probably have over 200 purchases requiring more rows than available.

If you are using *VIP Calc*, you have 1,024 rows available and can put the whole year in one spreadsheet, assuming there will be enough memory; it won't hurt to take the chance. If you do run out of memory in the middle of November, whip up a new template to finish out the year.

Now the joker in the back of the room who was selling 4K memory chips as antiques asks "why not put two six-month templates side by side." This would work, but would not be as neat when we insert rows in months that have a large number of purchases, while the adjacent month does not need these extra rows.

The top portion of our template is shown in Figure 1 as seen on the 17-line *Elite*Calc* or *VIP Calc* screen. To simplify setup, I made the monthly template 15 lines long. This way a month will start at either X1 or X6-, or 16 or 31, for example. Once you start using the template this order will be lost when you insert lines, but by that time it will have served its purpose.

Figure 1: One-Month Template

```
   [  A  ][       B        ][  C  ][  D  ]
 1-  MONTH-
 2-DAY          PURCHASE           TAX     TOTAL
 3-
 4-
 5-
 6-
 7-
 8-
 9-
10-
11-
12-
13-
14-          MONTHLY TOTAL           0         0
15-
16-  MONTH-
17-DAY          PURCHASE           TAX     TOTAL
```

The first order of business is to plan the column widths. The only column needing to be wider than the default nine characters is 'B' for purchase description. Set this at 16. Column A for the date, 'C' for the Tax and 'D' for the total sale can stay at nine characters.

Next comes formatting. In Column A, dates are to be neatly shown left-justified under the heading. In *Elite*Calc*, strike 'F' to get the format command, then 'A' for Column A and finally 'L' to left-justify numbers. In a similar fashion, put a '$' format on columns C and D.

In *VIP Calc* and *DynaCalc*, one FORMATs individual cells and then REPLICATEs those cells down a column. *DynaCalc* won't format an empty cell, so put a space into the cell and then format it. *VIP Calc* has a centering format which you can use rather than the left justification for Column A. Once you have formats in cells A3, C3 and D3, hit /R to call replicate. You are asked the starting range which is A3 . . . D3, then the target range which is A4 . . . A15.

Labels can be typed in any time. Formats apply here and can be handled in a number of ways. *Elite*Calc* and *DynaCalc* accept leading spaces and you can manually add the number needed to place the label just so. Too many? Edit the line to take one or more out. *VIP Calc* won't accept leading spaces, but you have the centering option available or right-justify the text with trailing spaces to move the label off the right cell boundary a space or two.

In Figure 1, "MONTH-" and "PURCHASE" were added with leading spaces in *DynaCalc*. "TAX" and "TOTAL" in Row 2 were right-justified as was "MONTHLY TOTAL" in B14.

Finally, we enter the summation formula in Cell C14 and replicate it to Cell D14. Its *Elite*Calc* form is =SUM(C3:C13) while *VIP Calc* and *DynaCalc* take @SUM(C3 . . . C13).

The intention is for the user to type in the month and year into Cell B2 or its copies after the MONTH- that is in A2. You might also want to put the month in A14 so that row might read:

```
    [   A   ][       B        ][  C  ][  D  ]
 14-JAN '85      MONTHLY TOTAL      X.XX   YY.YY
```

DynaCalc lets you use a formula to duplicate what you type into B2, say into A14 — it is @IF(@TRUE,B2). This works on both numbers and labels.

That completes our template for one month of entries. You will need more than 11 lines most months. In *Elite*Calc*, put the cursor on Row 14 or its equivalent in copies and insert however many additional rows you need.

In *VIP Calc* and *DynaCalc*, you do the same thing, but you also must replicate a blank and formatted row of cells into the Column A range for the new rows inserted. Say you inserted six new rows. Cells A14 . . . D14 become A20 . . . D20. The cells in the range C14 . . . D19 now are not formatted. Replicate A20 . . . D20 to the target range A14 . . . A19 to do the formatting.

Now is the time to put some data into the template to make sure it works right. The first law of computing is, "There are always bugs." It applies to spreadsheets as well as any other type of programming. It is most important to get this one right to avoid having the same errors show up in each copy.

Now that things are right and you have cleared your test data out, it's time to copy the one-month template a number of times to make the overall template. But, first we must observe the second law of computing, "Save early and often." For *Elite*Calc* users this is a safety play. *DynaCalc* and *VIP Calc* users will need this file to build their complete templates.

*Elite*Calc*'s COPY command makes generating the full template a piece of cake. COPY A1:D14 to A16. *Elite* asks "Options (V,N,Q)." Choose 'V' and only the values are copied. Choose 'N' and the formulae will not be adjusted to reflect their new locations in the spreadsheet. We don't want either of these options. We might choose 'Q' and *Elite* will ask (Query) for each cell referenced if it is to be adjusted. Actually, we want all cell references to be

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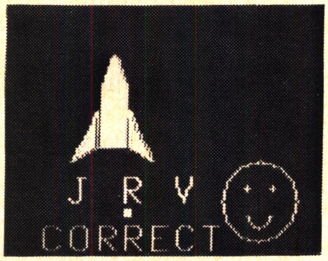

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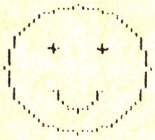

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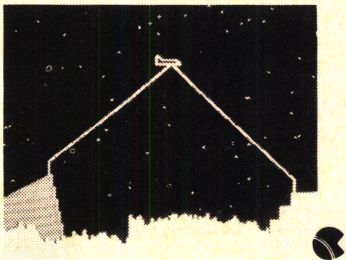

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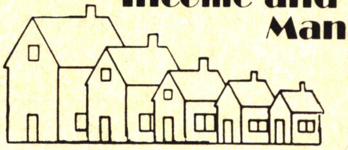

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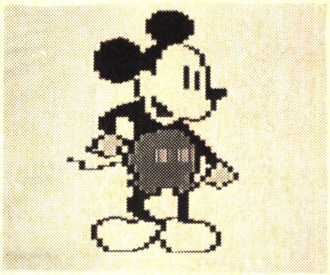

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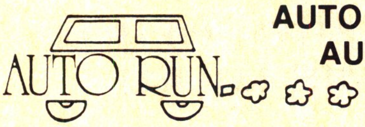

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adjusted, so hit ENTER.

Now we have two months' worth of templates ending at Row 29. Leaving Row 30 blank like Row 15, COPY A1:D29 to A31. Now there are four. COPY A1:D29 to A61 to complete a sheet for six months of data. One last task is to provide totals for this sheet and year-to-date totals.

```
    [  A  ][        B         ][   C   ][   D   ]
89-JUN '85       MONTHLY TOTAL     XX.XX   YYY.YY
90-TOTALS THIS SHEET              XXX.XX  YYYY.YY
91-TOTALS PREVIOUS SHEET
92-YEAR TO DATE TOTALS            XXX.XX  YYYY.YY
```

Cell C90 contains the formula =C14+C29+C44+C59+C74+C89. This adds up all the monthly totals. Note the pattern X4+X9+X4+X9 . . . which results from our keeping 15 row increments for each month. Patterns like this make it easy to set up formulae from memory without having to go back through the spreadsheet to write down cell addresses. Patterns also help avoid errors since mistakes tend to stand out as something different.

Cell C92 contains =C90+C91. *VIP Calc* and *DynaCalc* users substitute '+' for '='. Now replicate the range C90:C92 to D90 and it's time to WRITE it to disk.

DynaCalc and *VIP Calc* lack a COPY command, but copies can be made using disk files, or in *VIP*'s case, disk or tape files. Neither program erases the existing spreadsheet when a new one is loaded. The procedure calls for inserting blank rows to move the existing sheet contents down enough to make room for the one to be loaded. Our one-month template uses 15 rows including the blank Row 15. INSERTing 15 rows above current Row 1 will make room.

DynaCalc owners can simplify the effort by using keysaver. Put the cursor on A1 and press BREAK to clear the keysaver buffer, then key /, I, R to insert one row. Now key /, K, 14 to repeat the preceding sequence 14 times. It takes a little time, but you get to watch rather than work.

Now load the single-month template and save it. It will overlay the new blank rows you added, making a two-

Figure 2: Example of One Month of Data in the Template

```
      [  A  ][        B        ][    C   ][    D   ]
103-  MONTH- MAY '85
104-DAY            PURCHASE          TAX       TOTAL
105- 1        TV TAPE               1.80       37.62
106- 3        MEYER'S               0.24        4.93
107- 4        MARSH                 0.46       51.01
108- 4        HARDWARE              0.45        9.31
109- 5        MEIJER                2.71       56.81
110- 10       CAR RENTAL            8.94      187.69
111- 11       MARCH                 0.73       57.20
112- 13       LAWN MOWER REPAIR     1.48       28.38
113- 18       MEIJER                0.27        5.50
114- 18       MARCH                 2.11      114.51
115- 20       MEIJER                0.42        8.75
116- 20       MEIJER                0.04        0.84
117- 25       MCALPINS              1.65       31.62
118- 25       MARCH                 1.20       97.87
119- 26       MEIJER                0.25        6.99
120-
121-MAY '85         MONTHLY TOTAL  22.75      699.03
```

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month template. Check it out and if all is well, save it to disk or tape. Now make two passes where 30 rows are inserted each time and then the two-month template is loaded.

Your final task is to add the sheet and year-to-date totals and save the complete template. Figure 2 is an example of the sheet in use. Note that our nice 15-rows-per-month pattern has been destroyed as more rows were added in prior months.

> ***"The concept of building a basic template and then repeating it over and over has wide application both at home and in business."***

The concept of building a basic template and then repeating it over and over has wide application both at home and in business. Data may be grouped in a variety of different ways depending on reporting needs. Weekly and monthly summaries are common. In business, monthly summaries are combined to produce quarterly reports and these are compiled into year-end reports. The implication is that data must be transferred from one spreadsheet to another.

VisiCalc pioneered data transfer through disk files and both *DynaCalc* and *VIP Calc* provide this capability. Our year-to-date totals are candidates for such transfers. It's true that for two numbers, writing them down and typing them into C91 and D91 of the new template when it is started would be easier. However, examples should be simple and easy to understand at the beginning; certainly transfer of two numbers qualifies on both counts. I will explain the *DynaCalc* steps.

Say it's the end of December and our summary at the end of the second spreadsheet for the year looks like this:

Example 1

```
   [  A   ][       B          ][  C   ][  D  ]
89-DEC '85       MONTHLY TOTAL    35.82  952.82
90-TOTALS THIS SHEET             154.87 3872.44
91-TOTALS PREVIOUS SHEET
92-YEAR TO DATE TOTALS           154.87 3872.44
```

We need to bring the totals from the previous sheet over. Load that sheet and move to the "TOTALS THIS SHEET" row. Key into *DynaCalc* /, S, #. The disk will run to load in the program that saves part of a speadsheet as a data file.

Next, *DynaCalc* asks "SL" for save or load; key 'S' for save. Now it asks for a filename. You tell it and it comes back with "CDL," asking if the data is to be saved by columns, rows or default which chooses whichever direction was last used. For now, use 'D' since the order makes no difference in an example as simple as this. Last, the program asks for the range to save, which would be C90 . . . D90 if we were using Example 1.

To load data, the cursor must be positioned on the cell where the loading is to start before the keystroke sequence /, S, #. Again, there is the disk operation and the SL options are presented; key 'L.' Next, you are prompted for a filename and finally the CDL option where you choose 'D' again. The disk works and the program comes back with something like this.

```
   [  A   ][       B          ][  C   ][  D  ]
89-DEC '85       MONTHLY TOTAL    35.82  952.82
90-TOTALS THIS SHEET             154.87 3872.44
91-TOTALS PREVIOUS SHEET         182.65 5034.88
92-YEAR TO DATE TOTALS           337.52 8907.32
```

This method becomes really useful in larger business spreadsheets where the same data is used in two or more different spreadsheets, or where data in last month's spreadsheets must be moved to new locations to be ready to enter this month's activities.

We will deal with this some in the future. If you want to try this earlier, I would suggest you get the book referenced earlier or another on either *Lotus 1-2-3* or *VisiCalc* that provides examples.

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Now, you can supercharge Basic with an impressive array of extra features WITHOUT sacrificing compatibility! ADOS is compatible with virtually 100% of commercial software. Customizing utilities are provided to allow user-defined command abbreviations, baud rate, step rate, tracks per disk (35 or 40), support of double-sided drives, and more. After customizing ADOS, you can have it burned into an EPROM that plugs into the Disk Basic ROM socket, or just use it in RAM as a 64K disk utility. (EPROM + burning will cost about $20--we provide information concerning how you can have this done.) Features include: • repeat and edit of the last direct-mode command • 26 definable control-key abbreviations • automatic line-number prompts • DOS command • lowercase command entry (a fine complement to a Lowerkit or PBJ WordPak) • COPY (filename) to (drive number) • AE error override option • RAM command (64K) • RUNM command • text echoing to printer • ML monitor • text file scan • enhanced directory • error trapping • hi-res text utility included (42, 51, or 64 characters per line)

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Color Micro Journal, February 1985

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Hot CoCo,May 1985

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Disk . . . $23.95 **Tape . . . $21.95** **Assembler source listing . . . Add 3.00**

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Tape . . . $21.95 (16K required) See July '83 review.

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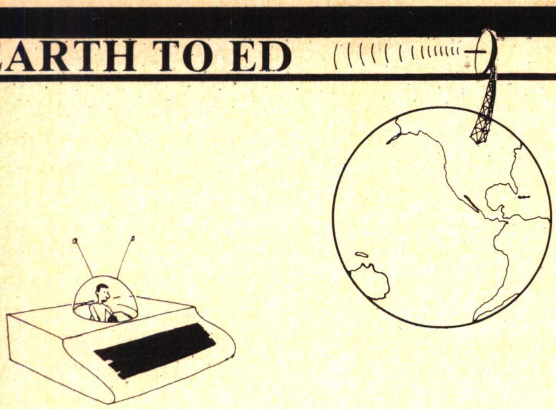

Pennsylvania-Fried CoCo

By Ed Ellers
Rainbow Technical Writer

- *Help! I fried my computer. I have an ET board CoCo which I upgraded to 64K, two disk drives, a CCR-81 cassette recorder, an Olivetti ink-jet printer and a PBH serial/parallel interface.*

I know I should not have done this, but the printer and PBH interface were on and the CCR-81 cassette was plugged in. I had not used the printer for months, so I put paper in it and "made sure it was ready." When I plugged the computer into the outlet, I heard a noise and smelled smoke. I didn't even push the plug all the way in. The computer was not switched on; I rechecked this as soon as it happened.

I opened the CoCo to inspect the damage. The fourth pin of the LM339N chip, U2 on the circuit board, was burned off and black, charred soot was on the resistor pack R5 on the board. I replaced this chip but got nothing.

I tried again the next day but could not get the screen to come in clearly. The middle sides of the screen seemed to disappear and the screen was wavy. I could see that the Extended BASIC *sign-on message came up, but then it would go away. I also noticed that the 10000 uF 16V capacitor, C20, was split on the black plastic at the top. Could this be damaged, also? I don't know what else is damaged.*

I have a number of questions.

1) *What caused this? A power surge, the PBH interface, or having the printer on before turning on the CoCo?*
2) *Are my disk drives and controller OK? The power cords were not plugged in, but the controller was plugged into the CoCo.*
3) *The PBH interface shows burn marks at the modem and printer connections. Is this dead, too?*
4) *Are my joysticks still alive?*
5) *Could my printer be dead? (I did get the self-test to work.)*
6) *If I take my computer to Radio Shack, will they remove my 64K upgrade?*

Willa Stokes
Philadelphia, PA

I don't think you did anything wrong. Radio Shack actually recommends turning on all peripherals before turning on the computer. What probably happened is the printer was damaged in some way that caused a short circuit from the power supply to the parallel interface connector. When you plugged in the CoCo, the high voltage had a path to ground — through the PBH interface and the CoCo.

Since the PBH interface was part of the path, it may have been damaged as well. Your joysticks and disk drives may or may not have suffered the same fate. When you get the computer running, try them out and see. Because the printer probably caused this incident, I suggest having a service technician check it out before trying to use it again.

Radio Shack's service center probably won't pull out your 64K RAM chips; if one or more are bad, though, they will probably replace the whole set.

Coffee Break

- *While my wife was using my CoCo 2 she accidentally spilled a few drops of coffee down the air vent. The next*

(Ed Ellers, a RAINBOW *and* PCM *staff member, is a self-confessed electronics fanatic whose other interests include science fiction.)*

time we turned it on, everything was trashed. We sent it off to Radio Shack, and they sent it back "repaired."

When I got it home, the system would crash when I tried to use Tom Mix Software's P-51 *and* Worlds Of Flight. *Both of these programs would start to load but would malfunction before loading was complete. According to Radio Shack, an "AX-9455, 64K PCB Stuffed was replaced. Tested unit and unit works OK."*

I sent it back to them and explained that these certain programs would not work, but others would. They sent it back saying nothing was wrong. I ended up buying a new CoCo.

Can I fix my old one? Which chip do you think is the problem?

Steve Hewitt
Versailles, MO

First of all, the "64K PCB Stuffed" means that Radio Shack replaced the entire main board of your CoCo, with all chips (with the possible exception of the Extended BASIC ROM). Since Radio Shack fixes so many computers, if a given machine is more difficult than usual to fix they will simply replace the whole board and send the old one in to a central location for reconditioning.

Your Extended BASIC ROM chip might have been damaged when the coffee was spilled, but in a way that isn't particularly obvious, and this same chip may have been installed in the new board. I'd try replacing it first.

WEFAX on the DMP-100

- *I was very much impressed with the* WEFAX *program which appeared in the February 1985 issue of* THE RAINBOW. *I downloaded the Radio Shack printer version,* WEFAXR, *from The Color SIG on CompuServe. I have been trying to get the graphics to work on my DMP-100 printer.*

It seems to work OK except that each pass spills over to the next line.

George M. Cox
Pittsburgh, PA

As you may know, a *WEFAX* frame has a resolution of 768 horizontal by 576 vertical. It takes up nine PMODE 4 screens. The DMP-100's horizontal resolution is 480 dots, so there just aren't enough dots to handle the picture.

If you have *Graphicom* (a *WEFAX* picture disk is compatible with this program), you can print each of the nine screens individually. Aside from that, I don't see any solutions.

Border Dispute

- *The data sheet for the Motorola MC6847 video generator used in the CoCo indicates that the border in alphanumeric and "semigraphic" modes is black, and all other modes have a green or buff border. My question is, can you change this border to black?*

Richard Beck
Portland, OR

My own reading of the 6847 data indicates that these border colors are fixed on the chip and can't be changed.

Diskette Labels

- *I know you have been questioned about far more technical problems, but to be honest, this one is driving me batty. You see, I can't seem to make diskette labels stick. It seems no matter what brand I buy, the labels which are included won't stay on! It is very distressing to remove a disk from a drive and see the label start to come off in the drive. What can I do?*

Charles M. Mac Leod
Taunton, MA

I personally use tractor-feed address labels that you would use with a mailing list program. They stick quite well, and since they are blank you don't have to bother with writing or typing between the lines.

Color Switcheroo

- *What is it with CoCo that it can't control the display of red and blue in* PMODE 4 *(i.e., hitting Reset may reverse the colors)?*

David A. Cromley
Cheyenne, WY

These "artifact" colors are caused by the position of the dots on the screen and the relationship they have to the color subcarrier signal. When you switch on or reset the CoCo, the 6847 video chip locks in on its master clock signal. The 6847 may lock to either the positive-going or negative-going side of the signal, which it locks to determine whether you get red and blue, or blue and red.

One-Liner Contest Winner . . .

The first listing, *Division*, asks for a numerator, a denominator and the number of decimal places desired. It then computes the problem to the specified accuracy. (The last decimal place is not rounded off.)

The second listing, *Times*, simply displays a multiplication table.

Listing 1:

```
1 CLS:PRINT@10,"LONG DIVISION":P
RINT:INPUT"NUMERATOR ";N:INPUT"D
ENOMINATOR ";D:INPUT"PLACES ";P:
FORC=1TOP+1:Y=INT(N/D):Y$=STR$(Y
):Y$=RIGHT$(Y$,1):PRINTY$;:IFF=0
THENF=1:PRINT".";:N=10*(N-(D*Y))
:NEXT:ELSEN=10*(N-(D*Y)):NEXT:EX
EC44539:RUN
```

Listing 2:

```
10 CLS:PRINT@10,"TIMES TABLES":P
RINT:FORX=1TO10:PRINTX;:NEXT:FOR
X=2TO10:FORY=1TO10:P$=MID$(STR$(
X*Y),2):PRINT@30+32*X+3*Y,P$:NEX
T:NEXT:EXEC44539
```

Leonard Dalenberg
Virginia Beach, VA

(For these winning one-liner entries, the author has been sent copies of *The Rainbow Book Of Simulations*, its companion *Rainbow Simulations Tape*, *The Rainbow Book of Adventures* and its companion *Rainbow Adventures Tape*.)

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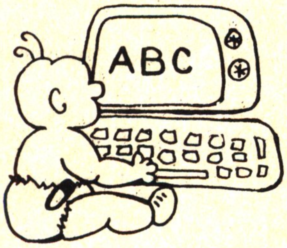

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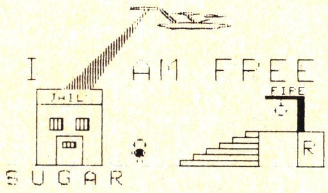

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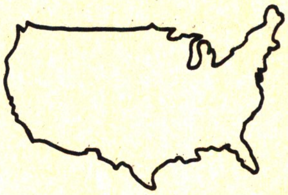

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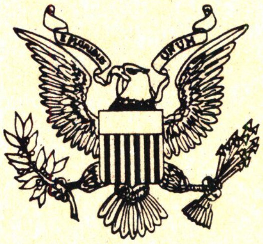

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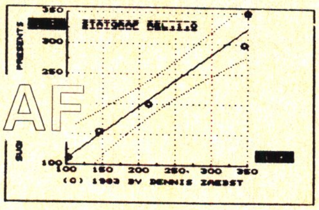
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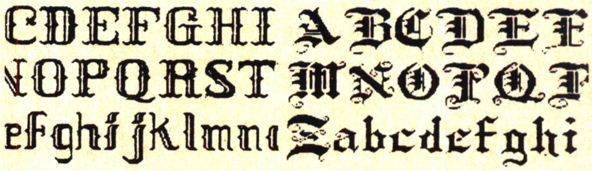
Requires a Bit mode printer. Works with most Epson, Okidata, Gemini 10X, R.S. Line Printer VII, DMP 100.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NOPQRST MNOPQR
efghijklmn Zabcdefghi

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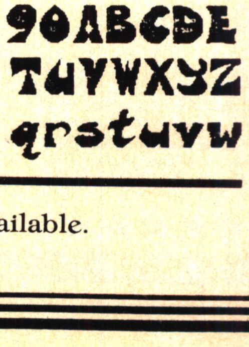
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51,700	★William Hearne, Decatur, AL
41,725	Erik Habres, Bordentown, NJ
35,600	Chris Morris, Colonial Heights, VA

ATOM *(Radio Shack)*

41	★Erik Huffman, Delran, NJ

BASEBALL *(Radio Shack)*

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BATS AND BUGS (THE RAINBOW)

24,600	★Michael Rosenberg, Prestonburg, KY
8,450	Bill Martin, Myrtle Beach, SC
7,200	Lezlee Bishop, Salt Lake City, UT
5,220	Brian Cook, Dixon, IL
4,000	Jon Hobson, Plainfield, WI
2,400	Steven Bullard, Allen, OK

BATTLE OF MIDWAY *(Ark Royal)*

1009:259	★Matt Hazard, Columbia Station, OH

BEAM RIDER *(Spectral Associates)*

577,330	★Bart Lyon, Queensland, Australia

BLACKJAK (THE RAINBOW)

$10,000	★Wayne Dewitt, Blue Island, IL

BLOC HEAD *(Computerware)*

41,975	★Michael Hebb, Victoria, Australia
27,000	Rodney Mullineaux, Gig Harbor, WA
23,500	Paschal Wilson, Kentwood, LA

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9,150	David Hart, Salt Lake City, UT

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13,000	Ken Dewitt, Blue Island, IL
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3,091,700	★Blossom Mayor, East Greenbush, NY

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115	★Glenn Della-Monica, Sacramento, CA

CANYON CLIMBER *(Radio Shack)*

286,800	★Beverly Herbers, Placentia, CA
162,500	Michael Sileo Jr., Glendale, NY
158,500	Scott Bellman, Davenport, IA
148,400	Brett Fancher, Hooksett, NH
140,500	Todd Wall, Durham, NC
129,000	Michel Lebrun, Anjou, Quebec
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2,431	★Jay Beam, Louisville, KY
1,535	Pierre-Jean Douillard, Granby, Quebec
1,245	Sean Conner, Summit, NJ
1,213	Doug Schwartz, Glendale, AZ
968	Michael Mefferd, Wren, OH

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104,200	★Blossom Mayor, East Greenbush, NY

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15,130	★Brett DuPont, Oregon, OH

COLOR CAR *(NOVASOFT)*

525,650	★Dan Bouges, Niantic, CT
163,032	Frank Canepa III, Santurce, Puerto Rico
154,600	Scott Cunningham, East Lyme, CT

COLORPEDE *(Intracolor)*

3,107,194	★John Ray, Goodlettsville, TN
133,036	Mariano Frausto, Blue Island, IL
23,450	George Frausto, Blue Island, IL
15,056	Hiram Esparza, Blue Island, IL

COSMIC INVADERS *(Spectral Associates)*

16,400	★Mariano Frausto, Blue Island, IL

CRYSTLE CASTLES *(ThunderVision)*

527,155	★Chris Cope, Central, SC
83,297	Craig Hoffmann, Kenosha, WI

CU*BER *(Tom Mix)*

19,550	★Rodney Mullineaux, Gig Harbor, WA

DALLAS QUEST *(Radio Shack)*

93	★Robert Sunderland, Sacramento, CA

DEFENSE *(Spectral Associates)*

56,720	★Brett DuPont, Oregon, OH

DEMON II (THE RAINBOW)

21,925	★Keith Schuler, Merritt Island, FL
12,475	Rhett Bagnall, Saskatoon, Saskatchewan
10,075	Frank Canepa III, Santurce, Puerto Rico
1,800	Bryan Ecker, Lusby, MD

DEVIL ASSAULT *(Tom Mix)*

64,741	★Eugene Little, Pierceland, Saskatchewan

DOODLEBUG *(Computerware)*

825,370	★Susan Ballinger, Uxbridge, Ontario
66,770	Sean Colsen, East Lyme, CT
38,130	Bob Dewitt, Blue Island, IL
13,290	Jennifer Richardson, New South Wales, Australia

DOUBLE BACK *(Radio Shack)*

614,450	★Eugene Roosa, Stone Ridge, NY
337,990	John Denn, Hobart, IN
286,570	Timothy Bishop, Jacksonville, FL
268,350	Marc Plouffe, Williston, VT
258,400	Alfredo, New York, NY

DOWNLAND *(Radio Shack)*

20,900,400	★Adam Petersen, Portland, OR
68,345	Alain Cyr, Valcourt, Quebec
67,456	Chris Mitchell, Byron, GA
67,141	Cliff Farmer, McGregor, TX
66,145	Jeanine McCuen, Rutland, MA
49,110	Martin Culver, San Francisco, CA
23,881	Edward Westcott, Sandy Hook, CT

DRACONIAN *(Tom Mix)*

628,470	★Jeff Coladonato, Roslyn, PA
398,890	Steven Coladonato, Roslyn, PA
358,550	Jamie Spreng, Dartmouth, Nova Scotia
241,290	Kristopher Staller, Ft. Wayne, IN
206,240	Joe Nauman, Sacramento, CA
172,640	Matt Mendez, Baltimore, MD

DUNKEY-MUNKEY *(Intellectronics)*

11,000	★Mariano Frausto, Blue Island, IL

FOODWAR *(Arcade Animation)*

165,960	★Chris Cope, Central, SC
74,120	Jim Partridge, Clinton, CT

FROGGER *(Cornsoft)*

15,860	★Erik Huffman, Delran, NJ
12,000	Nicole Freedman, Wellesley, MA

GALAGON *(Spectral Associates)*

1,306,640	★Jackie Maddox, Iron Station, NC
219,670	Brian Wagner, Lawrence, KS
214,920	Tony Smith, Gig Harbor, WA
204,820	Arnold Snitser, Los Angeles, CA
144,710	Brendan Smith, Coral Springs, FL

GLAXXONS *(Mark Data)*

19,146	★Terry Moore, St. Catherines, Ontario

GOLD RUNNER *(NOVASOFT)*

149,450	★Chris Cope, Central, SC
65,800	Dan Bouges, Niantic, CT
65,800	Sean Colsen, East Lyme, CT

GUARDIAN *(Quasar Animations)*

4,350	★Jason Forbes, Mexico, NY

ICEMASTER *(Arcade Animation)*

14,525	★Jean-Pierre Boisclair, Asbestos, Quebec

THE INTERPLANETARY FRUIT FLY (THE RAINBOW)

37,000	★Scott Perkins, Port Orange, FL
29,500	Andrew Bartels, Sulphur, OK
27,500	Les Dorn, Eau Claire, WI
26,000	Eric Foss, Cochrane, Alberta
25,500	Michele Gaboriault, Foxboro, MA
20,500	Steven Bullard, Allen, OK
13,500	Richard Hoey, Rome, NY

THE JUNGLE (THE RAINBOW)

668,690,000	★Jeff Lawrence, Cambridge, Ontario
459,351,041	Denise Morin, Hudson, MA
4,560,144	Jon Hobson, Plainfield, WI
4,134,000	Brandon Duncan, Benton, KS
1,659,162	Jay Andraschko, Yuma, AZ

JUNKFOOD (THE RAINBOW)

1,187,520	★Larry Thomson, Menominee, MI
1,079,600	Jean-Francois Morin, Loretteville, Quebec
338,930	Jon Hobson, Plainfield, WI
309,460	Shirley Black, Quinton, AL
206,940	Rhett Bagnall, Saskatoon, Saskatchewan

KATERPILLAR II *(Tom Mix)*

156,317	★Uwe Steingens, Essen, West Germany
135,467	Thomas Tiggelbeck, Essen, West Germany
97,735	Sabine Bergholz, Essen, West Germany

KEY BOMBER (THE RAINBOW)

29,052	★Tony Boring, Armagh, PA

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1,670,900	★Yolanda Farr, Sayre, PA
1,003,400	Tim Rueb, Atlanta, GA
543,400	Doug Tower, Colonial Heights, VA
337,800	Kirk Carter, Cooper City, FL
301,700	Jennifer Richardson, New South Wales, Australia
14,500	Ken Dewitt, Blue Island, IL

KING TUT *(Tom Mix)*

138,500	★Martin Culver, San Francisco, CA

KRON *(Oregon Color Computers)*

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LASERWORM & FIREFLY (THE RAINBOW)

38,380	★Brian Voges, Jasper, IN
34,636	Brad Bauer, Proctorville, OH
25,776	Jason Forbes, Mexico, NY
19,780	Jim Partridge, Clinton, CT
13,834	Dean McWhorter, Argyle, NY

LUNAR-ROVER PATROL *(Spectral Associates)*

136,700	★Lori Day, Arlington, TX

MADNESS & THE MINOTAUR *(Radio Shack)*

240	★Chris Mitchell, Byron, GA
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MARATHON (THE RAINBOW)

307,790	★James Sheedy III, Tonawanda, NY
189,683	Eric Gadlage, Jasper, IN

MAZELAND *(Chromasette)*

21,060	★Todd Knapp, Prairie du Chien, WI
8,550	Brian Cook, Dixon, IL

MEGA-BUG *(Radio Shack)*

10,661	★Blain Jamieson, Kingston, Ontario
7,930	Ron Haines, Nepean, Ontario
3,998	Christopher Romance, Massapequa Park, NY
3,693	Jim Partridge, Clinton, CT
1,250	Jay Aust, Marlborough, CT

MICROBES *(Radio Shack)*

491,100	★David & Alan Heckler, Hartselle, AL
237,560	Todd Bartels, Coal Valley, IL
178,550	Apollo Latham, Rich Square, NC
144,350	Theodore Latham Jr., Rich Square, NC
128,680	Ralph Hurst, Lake City, FL

MISSILE BARRAGE (THE RAINBOW)

2-1	★Joe Calcaterra, Ridgewood, NY

MOON HOPPER *(Computerware)*

73,550	★Eric Gadlage, Jasper, IN
60,280	Rodney Mullineaux, Gig Harbor, WA

MR. DIG *(Computerware)*

3,259,750	★Ellen Ballinger, Uxbridge, Ontario
3,100,650	Biagio Di Lorenzo, Montreal, Quebec
3,001,100	Ross & Daniel Mehlman, Todd Boehm, Nashville, TN

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2,875,870	Ann-Marie MacKay, Port Hardy, British Columbia
2,520,650	Thomas Henry, Boca Raton, FL
MUDPIES *(MichTron)*	
981,700	★Jon Blow, San Diego, CA
345,100	Brian Wolfgram, Freeland, MI
285,600	Stephen Zamonski, Ewing, NJ
137,000	David Craft, Roanoke, VA
123,100	Matt Johnson, Eagle, PA
OUTHOUSE *(MichTron)*	
172,270	★Matt Johnson, Eagle, PA
23,730	Brian Wolfgram, Freeland, MI
14,663	Aaron Repath, Tucson, AZ
13,200	Michel Lebrun, Anjou, Quebec
PAC-TAC *(Computerware)*	
120,050	★Matt Johnson, Eagle, PA
32,815	Maria Cawood, Houston, TX
14,425	Alfredo, New York, NY
PENGUIN (THE RAINBOW)	
48,250	★Paul Wagorn, Carp, Ontario
39,250	Kirby Smith, York, PA
22,670	Gary Bedford, Piqua, OH
14,550	Matt Funk, Hanover, PA
14,540	Michael Nelson, Lancaster, PA
PHANTOM SLAYER *(Med Systems)*	
1,326	★Susan Ballinger, Uxbridge, Ontario
124	Chris Morris, Colonial Heights, VA
PIPELINE (THE RAINBOW)	
2,829	★Mike Garozzo, Morrisville, PA
1,332	Kent Prehn, Carol Stream, IL
925	Andy Green, Whitehall, PA
483	Susan Ballinger, Uxbridge, Ontario
405	Joe Bironas, Crestwood, KY
POLTERGEIST *(Radio Shack)*	
6,000	★Billy Fairfull, Charleston, SC
4,900	Brett Fancher, Hooksett, NH
4,900	Kristine Haines, Nepean, Ontario
4,885	Frank Canepa III, Santurce, Puerto Rico
4,830	Lisa Ballinger, Uxbridge, Ontario
4,830	Joel Peacock, Thousand Oaks, CA
4,200	Bryan Ecker, Lusby, MD
POOYAN *(Datasoft)*	
3,785,000	★Ben Collins, Clemson, SC
1,546,000	Jeff Connell, Winona, MN
1,250,350	Richard Hawkins, Cleveland, TN
978,450	Christopher Romance, Massapequa Park, NY
900,250	Daniel Belisle, Montreal, Quebec
117,250	Brad Bauer, Proctorville, OH
108,450	John Hopkins, Salisbury, MD
78,600	Bob Dewitt, Blue Island, IL
50,450	Ken Dewitt, Blue Island, IL
11,450	Helen Dewitt, Blue Island, IL
8,500	Hiram Esparza, Blue Island, IL
POPCORN *(Radio Shack)*	
45,210	★Mike Norris, Columbia, SC
41,910	Nicole Freedman, Wellesley, MA
36,500	Barry Stanton, North East, PA
34,900	William Blaine III, Gallipolis Ferry, WV
32,430	Chris Bosl, Temple, TX
PROJECT NEBULA *(Radio Shack)*	
2,750	★Jeff Murphy, Lake City, GA
2,005	Christopher Romance, Massapequa Park, NY
PYRAMID *(Radio Shack)*	
220/112	★Byll Adams, Pasadena, TX
220/112	★George Fairfield, Victoria, British Columbia
220/112	★David Oelhaupl, Calgary, Alberta
220/114	Chris Mitchell, Byron, GA
220/140	Bette Hatcher, Norwalk, CA
Q-NERD (THE RAINBOW)	
1,958,950	★Bruce Baltzer, Hanover, Ontario
240,770	Dan Kaltenbaugh, Sandy Lake, PA
61,290	Sean Conner, Summit, NJ
QUIX *(Tom Mix)*	
907,320	★Andrew Norrie, Mississauga, Ontario
525,633	Clayton Foxworth, Florence, SC
447,353	Stephane Asselin, Baie-Comeau, Quebec
323,373	Jean-Francois Lauzier, Asbestos, Quebec
271,965	Nicole Freedman, Wellesley, MA
213,988	David Royster, Chicago, IL
RAAKA-TU *(Radio Shack)*	
50	★Ryan Devlin, Louisville, KY
50	★Todd Knapp, Prairie du Chien, WI
40	Robbie Haines, Nepean, Ontario
RACER (THE RAINBOW)	
174.9	★Kirby Smith, York, PA
164.5	Brian Voges, Jasper, IN
159.9	Frank Canepa III, Santurce, Puerto Rico
90.2	Chris Neal, Wabash, IN
RADIO BALL *(Radio Shack)*	
4,510,740	★Les Dorn, Eau Claire, WI
3,708,810	Stephen Zamonski, Ewing, NJ
1,738,150	Mickey Emberton, Indianapolis, IN
1,629,200	Benoit Lareau, Montreal, Quebec
1,511,640	Kelly Dion, Cap-de-la-Madeleine, Quebec
REACTOIDS *(Radio Shack)*	
5,257,295	★Gary Bedford, Piqua, OH
73,240	William Blaine III, Gallipolis Ferry, WV
RETURN OF THE JET-I *(ThunderVision)*	
538,432	★Matt Griffiths, Stilwell, KS
429,160	Jean-Francois Bruneau, St-Hubert, Quebec
203,500	Jamey Maumus, New Orleans, LA
REVERSE (THE RAINBOW)	
7	★Jon Hobson, Plainfield, WI
ROAD RACE (THE RAINBOW)	
91.7	★Bill Martin, Myrtle Beach, SC
576.6	Eric Clarkson, Missouri City, TX
706.1	Michael Hebb, Victoria, Australia
1212.4	Michael Martens, Wausau, WI
2158.5	Steven Roth, Fannystelle, Manitoba
ROBOTTACK *(Intracolor)*	
36,090	★Hiram Esparza, Blue Island, IL
RUN FOR YOUR LIFE (THE RAINBOW)	
20,000	★Ryan Devlin, Louisville, KY
10,000	Kirby Smith, York, PA
SAILOR MAN *(Tom Mix)*	
602,800	Aaron Samuels, Monument, CO
596,700	Jeff Picketts, Brantford, Ontario
582,820	Frank Canepa III, Santurce, Puerto Rico
545,800	Brandt Roberson, Collinsville, IL
535,900	Scott Sherman, Woodstown, NJ
210,500	Brian Roberson, Collinsville, IL
SANDS OF EGYPT *(Radio Shack)*	
80	★John Allocca, Yonkers, NY
80	★Bob Dewitt, Blue Island, IL
82	Jeff McKay, Travis AFB, CA
97	Phill Zarfos, Dallastown, PA
98	Aaron Durkee, Lansing, MI
102	Clyde Siverd Jr., Saratoga Springs, NY
252	Pat Cameron, Chippewa Falls, WI
SEA DRAGON *(Adventure International)*	
39,030	★Brian Wolfgram, Freeland, MI
12,000	Ken Dewitt, Blue Island, IL
SHAMUS *(Radio Shack)*	
62,940	★Jon Blow, San Diego, CA
56,860	John Lake, Princeton, IL
SHENANIGANS *(Mark Data)*	
96	★N. Wakelin, Mt. Lebanon, PA
103	Chris Cope, Central, SC
SHOOTING GALLERY *(Radio Shack)*	
227,840	★Cliff Farmer, McGregor, TX
24,000	Bob Dewitt, Blue Island, IL
SKIING *(Radio Shack)*	
01:00	★Scott Clevenger, Fairmount, IN
01:00	★Billy Fairfull, Charleston, SC
01.10	Mike Scharf, Fremont, OH
01:12	Sean Conner, Summit, NJ
05.85	John Hokpins, Greenville, SC
SLAY THE NERIUS *(Radio Shack)*	
472,667	★Jim Herbers, Placentia, CA
221,496	Shirley Herbers, Placentia, CA
76,273	Scott Bellman, Davenport, IA
SNAKER (THE RAINBOW)	
1:24	★Luanne Ashby, Phoenix, AZ
1:25	Dan Sobczak, Mesa, AZ
1:37	Susan Ballinger, Uxbridge, Ontario
1:50	Andy Green, Whitehall, PA
1:59	Baiju Shah, Deep River, Ontario
SOLO POKER *(Datasoft)*	
1,100	★Carol Staker, Moscow, ID
690	Robert Peterman Jr., Newton, TX
SPACE AMBUSH *(Computerware)*	
29,480	★Frank Canepa III, Santurce, Puerto Rico
SPACE ASSAULT *(Radio Shack)*	
19,065	★Steven Allen, Sharpsburg, MD
SPACE RACE *(Spectral Associates)*	
83,422	★Mark Donahue, Alexandria, VA
11,600	Mario Asselin, Baie-Comeau, Quebec
SPEED RACER *(MichTron)*	
126,750	★Jack Manzullo, Saginaw, MI
121,260	Paul Kenyon, Phoenix, AZ
115,410	Jean-Francois Pigeon, Villemontel, Quebec
111,200	Mike Rebbecchi, Somerdale, NJ
109,440	Dan Bouges, Niantic, CT
56,420	Jennifer Richardson, New South Wales, Australia
STARSHIP CHAMELEON *(Computerware)*	
68,800	★Brian Voges, Jasper, IN
STELLAR LIFE-LINE *(Radio Shack)*	
119,030	★Brian Shaber, Boise, ID
101,430	David Barnekow, Elkhorn, WI
73,950	Lori McCullar, Brazil, IN
62,390	Andrew Lawrence, Cambridge, Ontario
39,210	Alfred Silva, Cranston, RI
STORM ARROWS *(Spectral Associates)*	
263,850	★Arnold Snitser, Los Angeles, CA
TEMPLE OF ROM *(Radio Shack)*	
959,400	★Sonya Hurst, Richmond, CA
837,600	David Oelhaupl, Calgary, Alberta
620,800	Rhea Jarrard, Olympia, WA
463,400	Glenn Alfrey, Olympia, WA
288,500	Carol Elliot, O'Leary, Prince Edward Island
TIME BANDIT *(MichTron)*	
1,025,210	★Terry Moore, St. Catherines, Ontario
747,460	Steven Coladonato, Roslyn, PA
359,980	Kristopher Staller, Ft. Wayne, IN
88,940	Brian Wagner, Lawrence, KS
68,390	Jamie Spreng, Dartmouth, Nova Scotia
31,980	Martin Culver, San Francisco, CA
THE TOUCHSTONE *(Tom Mix)*	
226,640	★Kristopher Staller, Ft. Wayne, IN
TRAILIN' TAIL (THE RAINBOW)	
273,390	★Jerry Dill, Grafton, MA
119,705	Diego Gallina, Summit, NJ
105,300	Jerry Dill, Frankfort, MI
102,930	Philip Parent, Smiths Falls, Ontario
94,810	Jean-Marc Parent, Smiths Falls, Ontario
TRAPFALL *(Tom Mix)*	
59,080	★Connie Bird, Ooltewah, TN
50,078	Lori Day, Arlington, TX
TUBE FRENZY *(Aardvark)*	
140,280	★Becky Baker, Marissa, IL
TUT'S TOMB *(Mark Data)*	
189,960	★Nicole Pouliot Coors, Mobile, AL
189,760	Jerry Austin, Baraboo, WI
184,380	Biagio Di Lorenzo, Montreal, Quebec
163,060	Michael McCafferty, Oceanside, CA
158,000	Chris Russo, Miami, FL
WHIRLEYBIRD RUN *(Spectral Associates)*	
54,500	★Jay Aust, Marlborough, CT
43,850	Glen Bilodeau, Otterburn Park, Ontario
30,100	Dan Durga, Flint, MI
27,300	Michel Lebrun, Anjou, Quebec
16,900	Stephane Asselin, Baie-Comeau, Quebec
WILLY'S WAREHOUSE *(Intracolor)*	
183,500	★Alan Morris, Chicopee, MA
93,700	Craig Kluger, Miami, FL
48,900	Stephane Asselin, Baie-Comeau, Quebec
ZAXXON *(Datasoft)*	
2,068,900	★Dave Levora, Oak Forest, IL
2,057,800	Chris Oberholtzer, Lexington, MA
1,700,000	Biagio Di Lorenzo, Montreal, Quebec
1,510,000	James Quadrella, Brooklyn, NY
850,500	Eric Gadlage, Jasper, IN
154,100	Brandt Roberson, Collinsville, IL
35,000	George Frausto, Blue Island, IL

— Debbie Hartley

SCOREBOARD POINTERS

In conjunction with THE RAINBOW's Scoreboard, we offer this column of pointers for our game-playing readers' benefit. If you have some interesting hints and tips, we encourage you to share them by sending them to the Scoreboard, c/o THE RAINBOW.

COMPELLED BY CURIOSITY

Scoreboard:

Curiosity has moved me to write in regard to the "Rainbow Scoreboard." Just how long will a score be published? If you keep *every* score that has been sent in from the start of the "Scoreboard" to now, you would have an awfully long list!

Andrew Bartels
Sulphur, OK

Editor's Note: First of all, each and every score that is sent in is published (at least for one month). In order to keep the "Scoreboard" at a minimum, two steps are taken. Approximately once every three months, those games that are inactive are deleted (meaning no scores have been submitted). Each month, for those games with new scores sent in, only the top five are kept (including previous ones and those submitted throughout a one month period of time). Any new scores not included in the top five are then added.

ADVENTURE CLUB

Scoreboard:

This letter is directed towards any Adventure fans.

Adventures are the best games and the experience can be more fun if you share solving them with someone else.

I would like to start a club of Adventure gamers. I will send you a list of all the addresses I receive so you can write to whomever you want. You can get opinions on games, and even clues and solutions.

I will send letters from time to time with new members, ideas and whatever information I can get on new Adventures, etc.

Please write to me. The more letters I receive, the better this will work. You can reach me at 1933 W. 36th St., 52806.

Scott Bellman
Davenport, IA

THE 113 BARRIER BROKEN

Scoreboard:

I have finally done it! I broke the 113 barrier for the number of moves in *Pyramid* with a full 220 out of 220 points in 112 moves.

I feel I know practically everything about the game *Pyramid*. If you need a step-by-step solution and a map, or just some advice before they haul you away in a "funny suit," send a SASE or $1 to cover expenses. My address is 1703 Marlock Lane, 77502.

I thank THE RAINBOW for having the "Scoreboard" and "Pointers" sections. If it were not for pointers I received for *Pyramid*, I never would have come up with the "112 Solution."

I will pass on this tip: 130 moves is the least number of moves you can make in *Pyramid* without your hands leaving the keyboard.

Byll Adams
Pasadena, TX

DEFEATING THE ROBOTS

Scoreboard:

I hope I can help those "Scoreboarders" needing a gentle push with the game *Major Istar* from Computerware. Can't get past the robot arcade segment? They don't descend randomly, so wait for the group of three to come down. As soon as this begins, go to the right and up the first hole. Wait to the right of this until the second robot descends through your hole. Immediately, race up through the next hole in the middle. Wait to the right of this hole for the left robot to descend and then move to the left of the hole for the right one to descend. Quickly race up the right hole and then to the top and you've made it!

Also, when you get to the poster of Mr. Dig, carry the mirror and enter the poster.

For those of you past these points, how do I make a radiation vaccine? What use is the air helmet? How do I put it on? Any help will be appreciated. Write to the "Scoreboard" or to me at 1157 Hampstead, 48732.

Steve Horstman
Essexville, MI

FOLLOW UP

Scoreboard:

Chuck Alvey [July 1985] had a good idea. I also have the *P51 Mustang Attack Flight Simulator* and enjoy playing it. If you would like to play, call me at 314-378-6336. I will be more than willing to call others, also. I don't mind playing after 11 p.m. when the rates are cheaper, or on Saturday or Sunday afternoon.

Maybe one day we can even have a tournament of some sort! I love the game, so call and let's fight.

Steve Hewitt
Versailles, MO

HACK THE HAIR

Scoreboard:

For those of you having problems with Mark Data's *Black Sanctum*, you can write to me and I will give you all the information you desire. A hint: To get the old caretaker to let you take the tools, you have to throw the jug. Use the garden shears to cut the woman's hair and then to get it; after that the woman is of no use.

I have a serious problem with *Syzygy* and *Trekboer*. In *Syzygy*, how can I beat Darth Vader in the light sabers battle? In *Trekboer*, how can I have any light in the south region, what is the blue button in the communications room for, how can I get the robot to do anything and how can I find the key needed to open the communication panel? My address is 825 Des jardins C.P.1234, J0L 1J0.

Stephane Lacoste
Marieville, Quebec

SEASTALKER

Scoreboard:

I recently received *Seastalker*, an excellent Infocom Adventure for the Color Computer 2. This is the first that I have heard of any type of their Adventure games available for the Color Computer.

Does anyone know how to get other Infocom Adventure games for the CoCo? I wrote to Tandy Home Education Systems, but they said the only available game is *Seastalker* and they sent me the address of the people I could contact to get it.

If you would like to get *Seastalker* for the CoCo, the address to write to for information is Tandy Home Education Systems, 1301 W. 22nd St., Suite 400, Oakbrook, IL 60521, or you can call them at 312-325-6150.

If you do find that you can get other Infocom games besides *Seastalker*, please contact me at 804 Broce Drive, 24060.

Also, I am willing to give advice on the Adventure games I have solved. They are *Shenanigans, Calixto Island, Sands of Egypt, Black Sanctum, To Preserve Quandic* and *Pyramid 2000*. Just send a SASE.

Jeff Hillison
Blacksburg, VA

LOST IN WONDERLAND

Scoreboard:

I am desperately in need of help with the Adventure game *Adventure in Wonderland*. Send any hints to me at Box 2777, 09021-5369.

Sue Nichter
APO, NY

A ONE-WEEK SOLUTION

Scoreboard:

I have solved *Sands of Egypt* in one week. If anyone needs help on it, feel free to contact me at 2164 Townline Rd., 44057, or call 216-259-2326.

Also, I need help on *Raaka-Tu*.

Jeff Hingey
Madison, OH

Scoreboard:

I need help with *Sands of Egypt*. When you go down the drain after draining the pool, what do you do? Whenever you type something in, it responds with "not in the dark!" Is the treasure under the pool or in the pyramid? If anyone can help me, please write to P.O. Box 234, 62257.

Becky Baker
Marissa, IL

Scoreboard:

I have solved the following games: *Bedlam, Black Sanctum, Calixto Island, Trekboer, Sea Search, Shenanigans* and *Dungeons of Daggorath*. If anyone is having trouble with those games, write to me.

I'm having trouble solving the game *Syzygy*. I can't use the teleporter in the airless corridor (you can enter it by typing `HOLD BREATH`) and I can't get past the electric wall on the second floor of the elevator. If anyone can help me, please write to 808 du Chateau, J3H 1N4.

Pierre-Etienne Michel
St-Hilaire, Quebec

SOUND TROUBLES

Scoreboard:

I recently purchased a Radio Shack Color Computer 2, 64K ECB, and when I play *Dungeons of Daggorath* I get different tones of sound than I get when I play it on my Color Computer I, 16K ECB. Why is this so? Write to me at P.O. Box 271, 11720.

Kenneth Hulse
Centereach, NY

Editor's Note: This problem may be caused by an incorrect clock trimmer setting, Kenneth, but a more likely answer lies in the fact that the new Color BASIC 1.2 and 1.3 ROMs perform many tasks much faster than the older versions. Try the program on another CoCo 2, if you can, and see what happens.

NOTHING TO DO

Scoreboard:

I'm having problems with an Adventure called *Salvage Island* from Adventure International. I'm stuck because I can't find anything to do. The Adventure comes in two parts and has something to do with an island and spaceships. I pride myself on being a great Adventure solver, but this one puts me to shame. Write to 1225 Lake Circle Dr., 47711.

Dale Lehmann
Evansville, IN

INVISIBLE KEY

Scoreboard:

I need some help with the Adventure *Bedlam*. Everytime I play I find a secret door, but I can't seem to get it opened. Also, everytime I try to get the green key the screen says "OK," but when I take inventory it isn't there! I also get stuck inside a shack after I poison the dog.

If there is anyone who can help, please contact me at 2110 Harland, 77055.

Brian Tritico
Houston, TX

MISSING TREASURE

Scoreboard:

Would some nice CoCo owner who plays *Pyramid* please send me a list of all the treasures you must have to get 220 points? I can only get 200 points and I don't know which treasure I'm missing! Any help would be happily received.

I could also use some help on *Raaka-Tu*. I can't kill the gargoyle with the candle. My address is Route 1, Box 358, 32776.

Dawn McDonald
Sorrento, FL

Scoreboard:

I need help on the Adventure *The Arconiax Assignment* (THE RAINBOW, July 1984). I can't get to any country streets. The places I can get to are: richly decorated bedroom, small hidden room, lovely Victorian garden, industrial-type roof, storehouse, grassy meadows and the mousehole.

I have gotten these objects: handwritten note, gravel, key, battle, crowbar, chocolate, paper, matches and the pine branch.

I am playing on the 32K version and the rhyme doesn't make sense to me. Anyone who knows how to get to a road or anything that may help me, please write to R.R. #1, Box 293, 15920.

Tony Boring
Armagh, PA

Scoreboard:

Help! Does anyone know what the last two treasures are for *Sea Search*? I've found the pearl, the silver and the golden anchor, but I can't find the last two.

In *Calixto Island*, I can't get past the pyramid.

In *Shenanigans*, if anyone has the solution it would be greatly appreciated.

I have solved *Black Sanctum* and if anyone needs help on it, just write to me at 5106 Carpenter Dr., 40014.

Joe Bironas
Crestwood, KY

Scoreboard:

Can any of your readers tell me if the sarcophagus in *Pyramid* can be opened? If so, how?

Any tips on *Madness and the Minotaur* would be helpful, also.

I have the games *Bedlam, Pyramid, Raaka-Tu, Klendathu, Madness and the Minotaur* and *Temple of ROM*. Write to P.O. Box 1308, 90651-1308 if you have any tips on any of these games. I'd love to hear from you CoCo 2 fans!

Bette A. Hatcher
Norwalk, CA

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"No wrap" mode for programs
Edits files up to 80Kb
Global Search/Change
SEDIT or SDOS can use 24 by 80
CRT via modem card with multipak

TYPE: Document Processor

Formats raw text mode with SEDIT
according to embedded commands
Automatic justification
Automatic pagination
Definable page titles/footings
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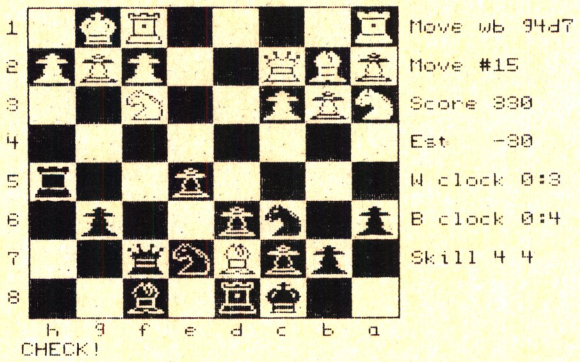

```
Move wb g4d7
Move #15
Score 330
Est    -30
W clock 0:3
B clock 0:4
Skill 4 4
CHECK!
```

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Want to try 10-meter platform diving?

TAKE THE PLUNGE

WITH COCO

By Timmy Jones

While watching the diving competition during the 1984 Olympics, I developed the idea for *10-Meter Platform Diving*.

To play the game choose forward or reverse dives, then press the down-arrow key to begin the dive and the space bar to finish the dive. You will have five dives to reach the highest possible score. Each dive is randomly scored (from one to 60) based on the difficulty of the dive. With a little practice, you will be doing dives even Greg Louganis would envy.

For harder-to-hit, perfect dives, insert a `POKE 65495,0` in the beginning of the program.

As a bonus, a similar program, *Springboard Diving*, will be included on this month's RAINBOW ON TAPE.

(Timmy Jones is 16 years old and a junior in high school. He enjoys helping his classmates to do programming on the school's computers. His hobbies include swimming, boating and working with his CoCo.)

```
80 .......149
290 ......118
530 ......239
750 ......114
1000 ......21
1210 .....251
1380 ......44
END .....167
```

The listing: PFRMDIVE

```
1 '*************************
2 '**  10 METER PLATFORM   **
3 '**      DIVING          **
4 '**                      **
5 '** BY TIMMY JONES       **
6 '**    P.O. BOX 7938     **
7 '**    CLINTON, LA 70722**
8 '*************************
10 CLEAR 100
20 CLS(7):PRINT @ 132,"10 METER
PLATFORM DIVING";:PRINT @ 172,"D
IVING";:PRINT @ 360,"BY TIMMY JO
NES";
30 PMODE 3,1:PCLS:SCREEN0,0
40 FOR LL=1 TO 60:X=RND(56)+100:
Y=RND(10)+140:PSET(X,Y,3):NEXT L
L
50 SP$="BM 100,150C3E2F2E2F2E2F2
E2F2E2F2E2F2E2F2E2F2E2F2E2F2E2F2
E2F2E2F2E2F2E2F2E2F2;BU4BL20L1BL4L1B
L4L1BL4L1"
60 CD$="BM100,90C2L3D3R1C3U2R2D2
L1U1D3L1D2C4L1D5R1U5R1D5R1U5R2C3
R4L5C4D5R1C3R3D2F1D1R2"
70 S1$="C3F2D8C4L1D5R1U5R1D5R1U5
L1D4C3D16U16L1D8L1U2D3C2R2C3R1C2
U3"
80 LF$="BM100,20S4C2L3D3R1C3U2R2
D2H1D3H1D2C4L1R4D1L4D1R4D1L4D1R4
D1L4D1R4L2C3D8F1"
90 T1$="C2R4D3L1C3U2L1D2L1U2L2D1
R2L3C4D1U3L5D1R4G1L3D1R4C3U1L1R1
D3L4D2U3R3"
100 MS$="BM200,47 C2L3D3R1C3U2R2
D2D1L2D2E1D2C4R1D5L3U5R1D6C3D6R3
L2U7C4U5R2C3R4"
110 DRAW"BM14,100;A0;XT1$;"
120 DRAW"BM14,129;A1;XT1$;"
130 DRAW"BM10,30;A3;XT1$;"
140 DRAW"BM10,60;A2;XT1$;"
150 DRAW"BM50,30;A0;XS1$;"
160 DRAW MS$
170 DRAW CD$
180 DRAW SP$
190 DRAW LF$
200 DRAW"BM 50,80;A1;XS1$;"
210 DRAW"BM 50,120;A3;XS1$;"
220 FOR Y=56 TO 60:PSET(5,Y,2):N
EXT
230 FOR Y=26 TO 30:PSET(8,Y,2):N
EXT
240 DIM CD(18),BS(22),SS(18),AA(
18),AB(140),AC(40),S1(30),S2(40)
,S3(30),S4(26),Q(30),T1(18),T2(1
8),T3(20),T4(20),MS(28),Z(28)
250 GET(92,88)-(114,108),CD,G
260 GET (46,14)-(60,60),S1,G
270 GET (100,130)-(140,150),BS,G
280 GET (110,140)-(140,150),SS,G
290 GET (14,64)-(58,86),S2,G
300 GET (46,100)-(86,120),S3,G
310 GET (90,4)-(108,42),S4,G
320 GET (190,40)-(210,66),MS,G
330 GET (190,10)-(250,30),AC,G
340 GET (200,100)-(220,124),Q,G
350 GET (200,10)-(210,46),AA,G
360 GET (190,42)-(210,68),Z,G
370 GET (0,12)-(22,42),T4,G
380 GET (0,38)-(22,68),T3,G
390 GET (0,84)-(22,114),T1,G
400 GET (0,108)-(22,138),T2,G
410 PCLS
420 FOR X=144TO218 STEP36
430 CIRCLE(X,30),20
440 CIRCLE(X,31),21
450 NEXTX
460 FORX=162TO200 STEP36
```

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```
470 CIRCLE(X,55),20
480 CIRCLE(X,56),21
490 NEXTX
500 CLS:INPUT"INSTRUCTIONS (Y/N)
";LL$
510 IF LL$="Y" THEN 520 ELSE 540
520 CLS:PRINT:PRINT"  INSTRUCTIO
NS:  YOU WILL HAVE  FIVE DIVES T
O SCORE AS HIGH AS  POSSIBLE. EA
CH DIVE IS SCORED ONA SCALE FROM
 1 TO 60. CHOOSE    FORWARD OR R
EVERSE DIVES, THEN  PRESS (DOWN
ARROW) TO BEGIN DIVEPRESS THE SP
ACE BAR TO FINISH   THE DIVE.
530 I$=INKEY$:IF I$=""THEN 530
540 GOTO 1500
550 DRAW"C3":FORX=0TO3:Y=30:LINE
(X,Y)-(X+30,Y+10),PSET,B:Y=Y+1:N
EXT X
560 DRAW"C3":LINE(30,170)-(255,1
91),PSET,B:PAINT(34,174),3,3
570 DRAW"C2":LINE(0,40)-(30,191)
,PSET,B:PAINT(2,172),2,2
580 DRAW"C2":LINE(30,40)-(70,50)
,PSET,B:PAINT(35,45),2,2
590 GET (50,170)-(250,190),AB,G
600 PUT (58,13)-(78,39),MS,PSET
610 SCREEN1,0
620 A$=INKEY$:IF A$<>CHR$(10) TH
EN GOTO 620
630 IF ZX=2 THEN 1270
640 X=72:Y=0:F=2
650 PUT(58,13)-(78,39),Q,PSET
660 FOR P=1 TO 4
670 F=F+F:IF F=>14 THEN F=14
680 Y=Y+F:X=X+1
690 PUT(X,Y)-(X+22,Y+30),T1,PSET
700 FOR O=1TO90:NEXTO
710 A$=INKEY$:IF A$=" "THEN 920
720 Y=Y+F:X=X+1
730 PUT(X,Y)-(X+22,Y+30),T2,PSET
740 FOR O=1TO90:NEXTO
750 A$=INKEY$:IF A$=" "THEN 970
760 Y=Y+F:X=X+1
770 PUT(X,Y)-(X+22,Y+30),T3,PSET
780 IF P=4 THEN 870
790 FOR O=1TO90:NEXTO
800 A$=INKEY$:IF A$=" "THEN 1070
810 Y=Y+F:X=X+1
820 PUT(X,Y)-(X+22,Y+30),T4,PSET
830 FOR O=1TO90:NEXTO
840 A$=INKEY$:IF A$=" "THEN 1020
850 NEXT P
860 REM ******* BAD DIVE *****
870 PUT(X,150)-(X+40,170),BS,PSE
T
880 PUT(X-10,150)-(X+50,170),AC,
PSET
```

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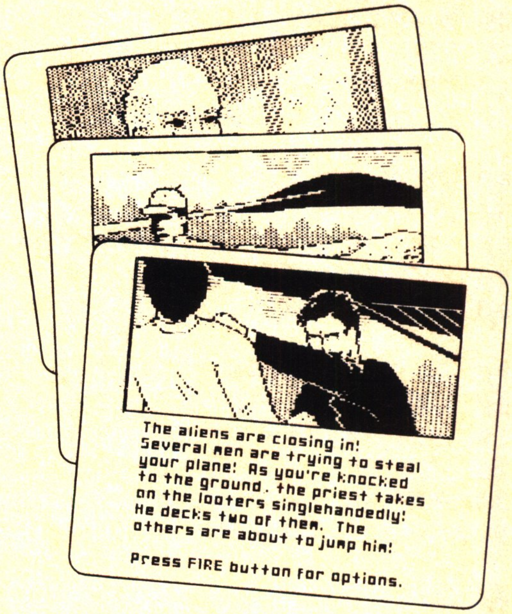

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```
890 PUT(50,170)-(250,190),AB,PSE
T
900 PLAY"T2AD":SD=RND(9)+10:GOTO
 1210
910 REM ********* S1 *********
920 X=X+6:Y=Y+2
930 PUT(X,Y)-(X+14,Y+46),S1,PSET
940 IF Y+42=>170 THEN 1120
950 X=X+0:Y=Y+10:GOTO 930
960 REM******* S2 ********
970 X=X+4:Y=Y+6
980 PUT(X,Y)-(X+44,Y+32),S2,PSET
990 IF Y+30 =>170 THEN 860
1000 X=X+0:Y=Y+10:GOTO 980
1010 REM ********* S3 ********
1020 X=X+4:Y=Y+6
1030 PUT(X,Y)-(X+40,Y+20),S3,PSE
T
1040 IF Y+30=>170 THEN 860
1050 X=X+0:Y=Y+10:GOTO 1030
1060 REM ******* S4 ********
1070 X=X+4:Y=Y+2
1080 PUT(X,Y)-(X+18,Y+38),S4,PSE
T
1090 IF Y+30=>170 THEN 870
1100 X=X+0:Y=Y+10:GOTO 1080
1110 REM ****** GOOD DIVE *****
1120 REM
1130 PUT(X,Y)-(X+22,Y+22),AA,PSE
T:PUT(X-10,160)-(X+20,170),SS,PS
ET
1140 PUT(X-10,150)-(X+20,170),AC
,PSET
1150 PUT(50,170)-(250,190),AB,PS
ET
1160 PLAY"T9EFDDAGG"
1170 IF P=1 THEN SD=RND(9)+10:GO
TO 1210
1180 IF P=2 THEN SD=RND(9)+20:GO
TO 1210
1190 IF P=3 THEN SD=RND(9)+30:GO
TO 1210
1200 IF P=4 THEN SD=RND(20)+40:G
OTO 1210
    TOTAL SCORE IS :";SC:PRINT:
INPUT"DO YOU WANT TO PLAY AGAIN(
Y/N)";Q$:IF Q$<>"Y"THEN END ELSE
 RUN
1250 FOR G=1 TO 1000:NEXT G
1260 GOTO1500
1270 Y=10:X=72:F=2:PUT(58,13)-(7
8,39),Q,PSET:PUT(X,Y)-(X+22,Y+22
),CD,PSET
1210 FL=FL+1:PRINT"  DIVE #:";FL
1220 PRINT"          SCORE LAST D
IVE:";SD
1230 SC=SC+SD
1240 IF FL=5 THEN PRINT"
 =============== ==":PRINT"
```

```
1280 Y=Y-2
1290 FOR P=1 TO 4
1300 F=F+F:IF F=>14 THEN F=14
1310 Y=Y+F:X=X+1
1320 PUT(X,Y)-(X+22,Y+32),T3,PSE
T
1330 FOR O=1TO90:NEXT O
1340 A$=INKEY$:IFA$=" "THEN X=X-
2:GOTO 920
1350 Y=Y+F:X=X+1
1360 PUT(X,Y)-(X+22,Y+32),T2,PSE
T
1370 FOR O=1TO90:NEXTO
1380 A$=INKEY$:IF A$=" "THEN 102
0
1390 Y=Y+F:X=X+1
1400 PUT(X,Y)-(X+22,Y+32),T1,PSE
T
1410 IF P=4 THEN 870
1420 FOR O=1TO90:NEXTO
1430 A$=INKEY$:IF A$=" "THEN 107
0
1440 Y=Y+F:X=X+1
1450 PUT(X,Y)-(X+22,Y+32),T4,PSE
T
1460 FOR O=1TO90:NEXTO
1470 A$=INKEY$:IF A$=" "THEN 970
1480 NEXT P
1490 GOTO 870
1500 CLS:PRINT"          TYPE OF
 DIVE":PRINT:PRINT"         (1) F
ORWARD":PRINT"         (2) REVERS
E"
1510 PRINT"       (1-2)";
1520 A$=INKEY$:IF A$<"1" OR A$>"
2" THEN 1520
1530 IF A$="1" THEN ZX=1 ELSE IF
  A$="2" THEN ZX=2
1540 CLS:GOTO 550
```

Hint . . .

A Quick Fix For RFI

If you're having trouble with RF interference when using the CoCo with color TV, take a look at the back of the set. Many color TVs (particularly later models) have a screw-on coaxial connector that's used for cable TV or master antenna systems and for some antennas.

You can use an adapter such as Radio Shack's 278-255 that screws onto the coaxial 'F' connector to plug your CoCo's TV cable directly into the TV without using the switch box; this often cuts RFI way down. Check the set's instruction manual (or label that may be on the back) to find out how to switch to the coaxial input; there's usually a jumper or switch near the connector.

16K
ECB

If you're lucky, you'll being seeing red . . .

Rid The Screen of the MENACE

GREEN

By James W. Wood

The only problem developing *Red-Green Game* was deciding what scenario could be used to fit the game's action. Should the player be neutralizing unstable radioactive isotopes, defusing time bombs, or perhaps flushing full septic tanks? At this point I asked why a game had to be based on some real situation. *Red-Green Game* involves the player and computer each turning squares different colors. The player is turning them red and the computer changes them to green; it is a battle of player against machine.

Red-Green Game starts with a screen filled with rows and columns of red squares. Three squares turn green. The large white rectangle at the top left of the screen is moved with the arrow keys. As the white block moves over a green square, the square changes back to red. While you are doing this, the computer changes the red squares to green. You lose when the total of green squares on the screen equals 10.

If you "clear" the screen of the green squares, the game continues to a more difficult level where greens appear at a faster rate. I don't believe anyone could get through difficulty level nine — this is a challenge to game players everywhere! Scores are figured on difficulty level and time to clear the screen, not on how many greens are changed to red.

Program Summary

Lines 30-70 create the graphics. Line 80 places three beginning green squares. Line 90 sets the starting position of the white rectangle. Line 100 determines if the white block lands on a green square. The white block is printed by Line 110. Line 120 prints the number of green squares in the lower left corner. Line 130 determines if you have cleared the screen of all greens or if you have lost. Lines 140-150 pick a location to change to green and make sure that position is not presently green.

The DL in Line 150 refers to difficulty level. As the game progresses, the value of DL decreases, thus placing greens at a faster rate on the screen. Lines 160-190 control the white block's movement and erase its previous position. Line 210 calculates and prints the score at the end of each screen.

Instructions are included in lines 230-290 (I believe in having directions within a program). They are much easier to find than instructions that are only in a magazine somewhere.

(For those having questions about *Red-Green Game*, you may contact Mr. Wood at 424 N. Missouri, Atwood, IL 61913. Please include a SASE.)

(James Wood teaches computer programming at Atwood Hammond High School. He holds master's degrees in instructional media and physical science education.)

```
150 .......30
250 ......107
END ......73
```

The listing: REDGREEN

```
10 CLS:PRINT:PRINT" RED-GREEN GA
ME.":PRINT" INSTRUCTIONS? (Y/N)?
"
20 A$=INKEY$:IFA$=""THEN20ELSEIF
A$="N"THEN30ELSEIFA$="Y"THEN270E
LSE20
30 CLS4:W$=CHR$(207):C$=CHR$(191
):BL$=CHR$(128)
40 A$=CHR$(128)+C$:D$=CHR$(128)+
CHR$(128)+CHR$(128):E$=CHR$(128)
+C$+CHR$(128)
50 W1$=CHR$(207)+CHR$(207)+CHR$(
207):W2$=W$+C$+W$:DL=9
60 FOR A=1 TO 15:B$=B$+A$:NEXTA
70 TIMER=0:CLS0:FOR A=32TO416STE
P64:PRINT@A,B$;:NEXTA
80 FORA=1TO3:R=RND(15)*2-1+RND(7
)*64-32:POKE1024+R,143:NEXTA:NG=
3
90 P=0
100 IF PEEK(P+33+1024)=143 THEN
NG=NG-1:SOUND100,1
110 PRINT@P,W1$;:PRINT@P+32,W2$;
:PRINT@P+64,W1$;
120 PRINT@480,NG;
130 IF NG=0 THEN 210 ELSE IF NG=
10 THEN 220
140 R=RND(15)*2-1+RND(7)*64-32
150 IF RND(DL)=DL THENIFPEEK(R+1
024)<>143THENNG=NG+1:POKE1024+R,
143:SOUND10,1
160 IF PEEK(341)=247 AND P>63 TH
ENPRINT@P,D$;:PRINT@P+32,BL$;:PR
INT@P+34,BL$;:PRINT@P+64,D$;:P=P
-64:POKE341,255:GOTO100
170 IF PEEK(342)=247 AND P<349 T
HENPRINT@P,D$;:PRINT@P+32,BL$;:P
RINT@P+34,BL$;:PRINT@P+64,D$;:P=
P+64:POKE342,255:GOTO100
180 IFPEEK(343)=247 AND P/64<>IN
T(P/64)THENPRINT@P,D$;:PRINT@P+3
2,BL$;:PRINT@P+34,BL$;:PRINT@P+6
4,D$;:P=P-2:POKE343,255:GOTO100
190 IFPEEK(344)=247AND (P+36)/64
<>INT((P+36)/64) THENPRINT@P,D$;
:PRINT@P+32,BL$;:PRINT@P+34,BL$;
:PRINT@P+64,D$;:P=P+2:POKE344,25
5:GOTO100
200 GOTO120
210 SC=SC+(10-DL)*INT(100000/TIM
ER):DL=DL-1:IFDL=0THEN250ELSECLS
4:PRINT@230,"DIFFICULTY LEVEL";1
0-DL;:PRINT@298,"SCORE";SC;:FORT
=1TO800:NEXTT:GOTO70
220 CLS:PRINT"FINAL SCORE";SC
230 PRINT:PRINT"PLAY AGAIN (Y/N)
?"
240 IFINKEY$="Y"THENRUNELSEIFINK
EY$="N"THENENDELSE240
250 CLS:PRINT"YOU DID THE IMPOSS
IBLE.":PRINT"YOU CLEARED THE SCR
EEN AT":PRINT"DIFFICULTY LEVEL 9
":FORT=1TO2000:NEXTT:GOTO220
260 REM JAMES W. WOOD, 424 N. MI
SSOURI, ATWOOD, IL, 61913
270 CLS:PRINT"USE THE ARROW KEYS
 TO GUIDE THE":PRINT"WHITE BOX.
AS THE BOX MOVES":PRINT"ONTO A G
REEN SQUARE, IT TURNS":PRINT"RED
. AT THE SAME TIME, THE"
280 PRINT"COMPUTER IS CHANGING T
HE RED":PRINT"SQUARES BACK TO GR
EEN. CAN YOU":PRINT"CHANGE THEM
ALL TO RED BEFORE":PRINT"THE COM
PUTER GETS TEN GREENS?
290 PRINT"IF YOU CAN, THE NEXT L
EVEL OF":PRINT"PLAY BECOMES FAST
ER.":PRINT:PRINT"GOOD LUCK!":PRI
NT"PRESS (S) TO START THE GAME."
300 IFINKEY$="S"THEN30ELSE300
```

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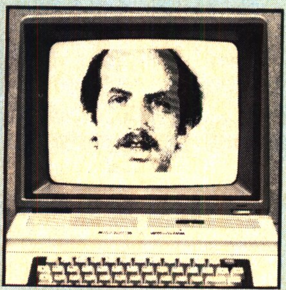

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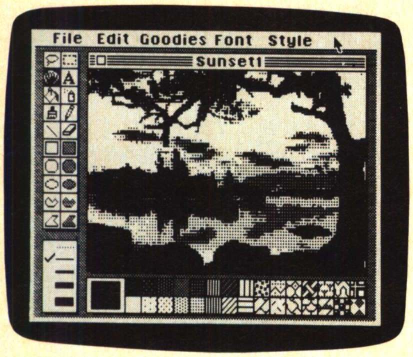
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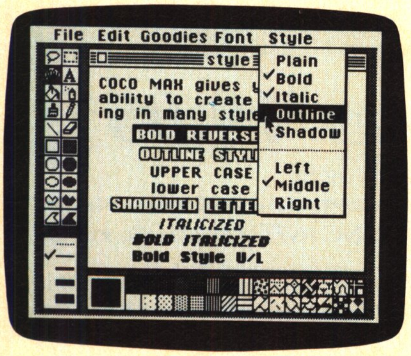
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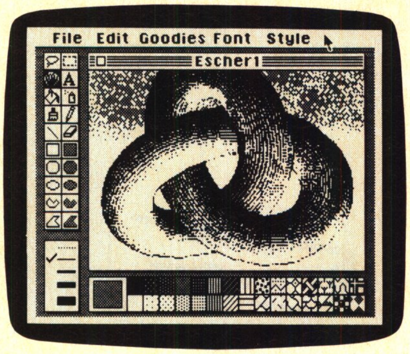
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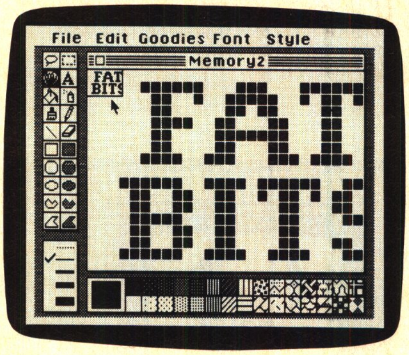
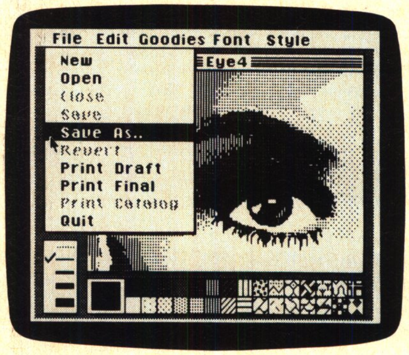
Because we took the maximum approach: highly optimized machine code combined with hardware, CoCo Max truly stands above the rest as the ultimate creative tool for the Color Computer. It's unrivaled performance lets you create with more brilliance and more speed than any similar system – much more than you ever imagined possible. And, you can do it in black & white or color.


File Edit Goodies Font Style
Memory2
FAT BITS
FAT
BITS

All the sophisticated power of the bigger systems is there: ***Icons, Pull-Down Menus,*** full ***Graphic Editing, Font Styles,*** and all kinds of handy tools and shortcuts.

Plug your joystick, mouse or touch pad into CoCo Max's Hi-Res Input Unit. Then use a delightfully simple ***Point-and-Click*** method to get any of CoCo Max's powerful graphic tools. It has them all:

You can ***Brush, Spray*** or ***Fill*** with any ***Color, Shading*** or ***Pattern.*** Use ***Rubber Band Lines*** and ***Shapes*** (square, rectangle, circle, elipse, etc.) to create perfect illustrations with speed and ease. There's a ***Pencil,*** an ***Eraser*** and even a selection of ***Caligraphy Brushes.*** And, as you can see, CoCo Max can do a lot with text.
All of the newest special effects are there: ***Trace Edges, Flip, Invert, Brush Mirrors,*** etc. And all of the very latest supercapabilities like: ***Undo,*** which automatically reverses your mistakes, and ***Fat Bits*** which zooms you way in on any part of your subject to allow dot-for-dot precision.


File Edit Goodies Font Style
Eye4
New
Open
Close
Save
Save As..
Revert
Print Draft
Print Final
Print Catalog
Quit

THE BIG PICTURE

The large image box in the middle of the CoCo Max screen is actually only a window on an even larger image. Use the Point-and Click "Hand" to effortlessly move your window over any portion of the larger image. You have a working area of up to 3-½ times the area of the window itself.

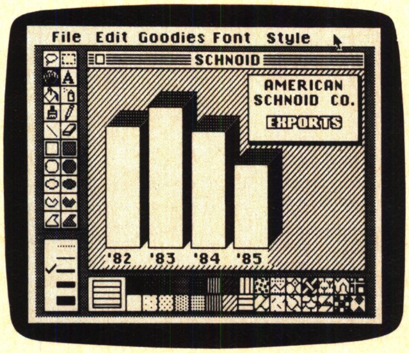
FLEXIBLE PRINTING...

CoCo Max gives you many ways to print. Fill a whole page with your image or condense two full CoCo screens to less than ¼ page for a finely detailed copy. "Dump" your CoCo Max screen full size or shrink it to ⅛ page size.

THE COCO MAX SYSTEM

FREEDOM TO CREATE...

Anyone who wants to create anything at all on their CoCo screen or printer will certainly be very glad to meet CoCo Max. CoCo Max's friendly yet sophisticated graphic and text capabilities let you almost instantly produce illustrations, diagrams, charts,



graphs, and computer art – for serious use or just for creative fun.

AN ABSOLUTE GUARANTEE

CoCo Max is a hardware/software system that no software-only system can match. Get CoCo Max and see your CoCo perform as it never could before. If you don't agree that CoCo Max is the ultimate creative tool for the Color Computer, simply return it within 20 days for a full, courteous refund from Colorware.

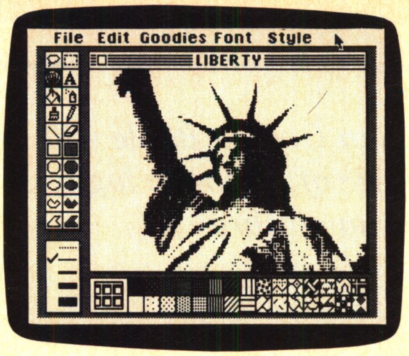
THE HARDWARE...

This is the key to CoCo Max's unmatched performance. Did you know the normal joystick input built into the Color Computer only allows access to 4,096 (64 x 64) points on the CoCo screen? Yet, the Color Computer's high resolution screen

COCO MAX
Hi-Res Input Unit
COLORWARE

has 49,152 (256 x 192) pixels. This means that a joystick, mouse or even a touch pad can, at best, only access about one tenth of the pixels on the CoCo screen.

Most graphic programs ignore this hardware limitation of the Color Computer and give you only low-res control. Others attempt to overcome the limita-



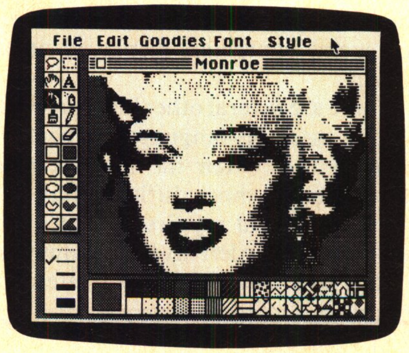
tion by using software schemes such as sliding windows. Although clever, these schemes yield sluggish and awkward results. Only CoCo Max does it the right way. The CoCo Max Hi-Res Input Unit plugs into your ROM slot and adds an entirely new joystick input to your computer – a precision one with a 49,152 point resolution to match the CoCo screen exactly.

Plug your same joystick, mouse or touch pad into this new input and you have a whole new kind of control. The difference is remarkable.

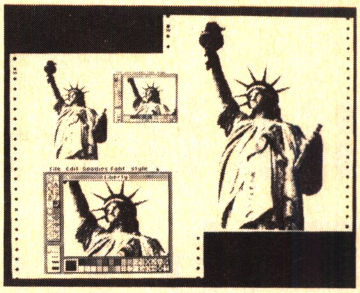
COCO MAX
CoCoMax

A DIGITIZER OPTION...

We studied all the video digitizers available and picked the best of them to link with CoCo Max. The DS-69 from Micro Works was our choice. This optional device lets you capture the image from any video source (video recorder, camera, etc.) on your Color Computer.



You may then use CoCo Max's graphic magic on it. The DS-69 is available as an option from Colorware from $149.95 complete with its own software on disk or tape. Using the DS-69 with a disk requires an RS multi-pak adaptor.



COCO MAX REQUIREMENTS

The CoCo Max System includes the Hi-Res Input Unit, software on disk or cassette (please specify) and user manual. It will work on any 64K Extended or non-extended Color Computer. You'll need a Radio Shack or equivalent joystick, mouse or touch pad. Disk systems require a Multi-Slot Interface or Y-Branching Cable.

THE COMPLETE COCO MAX SYSTEM, with software on ***DISK***...........***$69.95***

with software on ***CASSETTE*** (Available Mar '85)........................***$69.95***

Y-BRANCHING CABLE-If you have a disk system but do not have a Multi-Slot Interface, use this economical 40-pin, 1 male, 2 female cable to connect the CoCo Max Hi-Res input unit and your disk controller to your CoCo.....***$27.95***

Sorry, COCO MAX is not compatible with JDOS

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Woodhaven, NY 11421
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British mathematician and logician George Boole will always be remembered for his style of symbolic logic, which is the foundation of Boolean algebra

Bit Banging With Boole

By R. Bartly Betts
Rainbow Contributing Editor

Many of you seem to appreciate the column's strategy of sticking to the assembly language basics and not leaving beginners behind, so I appreciate your phone calls and letters letting me know this.

What is really great to hear, and what seems to confirm the validity of this approach, is that many of you have progressed past the beginners stages and are striking out on your own. In fact, some who started with my first column are far beyond my own expertise and are asking questions I can't answer. I have always believed if this column gets you over the first hurdles of assembly language programming, you can easily pick up more advanced programming from other articles and books.

While there is a lot of good information out there in the world, there seems to be a real lack of solid, *basic* information. Once you know what bits and bytes are, what Boolean logic is all about, how to read source code, etc., there are books full of information to take you to whatever programming heights you wish to go.

(R. Bartly Betts is currently a technical writer for Tandy Corp. and is a former news reporter and magazine editor. As the father of 10 children, computers are his escape from reality.)

Dedicated to Boole

With this in mind, I am dedicating this column to George Boole, the British mathematician, logician and author who developed the logic system called Boolean algebra — a prime ingredient of any computer programming language. The dictionary says that Boolean algebra is: "Any of various algebraic systems based on mathematical forms and relationships borrowed from the symbolic logic of George Boole."

If that tells you anything you wanted to know about Boolean logic, you have a much better understanding than I. It is enough, however, to get us started. You might recall I told you about the workings of the XOR-type Boolean logic in a past column. I used the logic to reverse characters displayed on the screen.

There are several other logic processes used in assembly language and each has its own use. Often the logic is made to look much more difficult than it is. I remember that my first introductions to Boolean logic left my head swimming. I hope this column demonstrates how simple (logical) Boolean logic is.

The concepts for discussion are AND, NOT, OR, NOR and XOR.

AND

Basically, AND says, "If all items of a comparison are true, the result is true." Although "true" can be expressed in more than one way, in this article I consider a value of one to be true and a value of zero to be not true. This approach is most commonly used and helps to keep the confusion to a minimum for now.

Because we are dealing with computer logic, the Boolean logic we are discussing is based on binary numbers, where one and zero are the only values possible for a single digit. This is probably a good place to stop for a definition; many people have trouble with the term "base" when referring to numbering systems: A numbering system's base is the maximum number of unique digits in the numbering system.

For example, our most common numbering system, base 10, has the digits '0' through '9' for a total of 10 digits. The binary numbering system, on the other hand, has the digits '0' and '1' for a total of two digits, thus it is called a "base 2" system.

Now, what does it mean when you compare two base 2, or binary, numbers using AND logic? It means you compare the two numbers, digit by digit or bit by bit, to see if one digit AND the other digit are both true (both have values of one). Let's try two numbers, 1 and 1. The result is:

```
         1        TRUE
AND      1        TRUE
--------------------------
         1        TRUE
```

Under the Boolean rules for AND, if both values in a comparison are "TRUE," then the result is true and the result of 1 AND 1 is also TRUE.

Let's try AND when the numbers are 1 and 0:

```
         1        TRUE
AND      0        FALSE
--------------------------
         0        FALSE
```

Only one of the two digits are true, thus the result is zero or FALSE.

Now let's try the numbers 0 and 0:

```
         0        FALSE
AND      0        FALSE
--------------------------
         0        FALSE
```

Let's carry the concept to larger numbers, 5 and 6. In binary, this is 1001 and 1010. When you AND 5 and 6, the result is:

```
         1001     5
AND      1010     6
--------------------------
         1000     4
```

The result of 5 AND 6 is 4. That doesn't seem to have any real use in the world, right? Well, that's what I thought at first, but I was wrong. AND logic has useful applications.

For instance, you can "mask" the value of any bit in a number using AND. Mask means you can cause the value of the selected bit to be either one or zero, regardless of its original value. For instance, to mask the number two bit of a four-bit number so it is always zero, AND the number with 1011 (remember the bits are numbered from the right, with the right-most bit being zero). The result:

```
       1101             1001             1111
AND    1011      AND    1011      AND    1011
------------------------------------------------
       1001             1001             1011
```

As you can see, no matter what value the number two bit begins with, once it is ANDed with 1011, the result always leaves the bit with a value of zero.

You can also use AND to determine the setting of any bit in a number. For instance, to determine the set values of bits zero and one in Register A, you could issue the command:

```
ANDA #3
```

The result is the value of the last two bits in Register A. If the Register A value is 1101, then the result is:

```
         1101
AND      0011
--------------------
         0001
```

The last two bits are 0 and 1 as shown.

OR

Comparing two numbers using OR is done in the same manner, only the logic is slightly different. In this case we are comparing to see if one number OR the other number is true. For instance, 1 OR 0 equals 1 (or TRUE):

```
         1        TRUE
OR       0        FALSE
--------------------------
         1        TRUE
```

Trying the numbers 1 and 1, the result is:

```
         1        TRUE
OR       1        TRUE
--------------------------
         1        TRUE
```

TIME BANDIT
Bill Dunlevy & Harry Lafnear
Tired of the same old screens? In TIME BANDIT, you pick from more than TWENTY places with over 15 levels in each place. That's over 300 screens! Visit FANTASY WORLD, WESTERN WORLD, & SPACE WORLD. Fight the Evil Guardians: Killer Smurphs, the Looking Lurker, Angry Elmo and more! Find the Keys and collect the treasures of time! Crisp Supergraphics, colorful SCROLLING landscapes, full animation, and over THREE HUNDRED SCREENS! The conquest of time and space awaits you!
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Bill Dunlevy & Doug Frayer
Explosive color, fast-moving animation and amazing sound make this non-violent game a classic! Different levels and more than FORTY screens offer as much challenge & good clean fun as you can take! Play solo or enjoy the challenge of two-player simultaneous competition. Scramble to get the loot first, but be careful: the KATS are prowling and your opponent is tossing eggs!
32K Tape $27.95/Disk $29.95

SUPER PAINT
by John Crane
Super Paint is an exciting new enhancement for your Graphicom drawing system. Break the chains restricting your creative freedom! Now you can draw and paint with every color your machine is capable of. Over 250 colors are available at all times! It's no longer impossible to find just the right shade or texture. Super Paint brings the COLOR back into your Color computer! Requires Graphicom system.
32K Disk $19.95

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Pontiac, Michigan 48053
(313) 334-6576

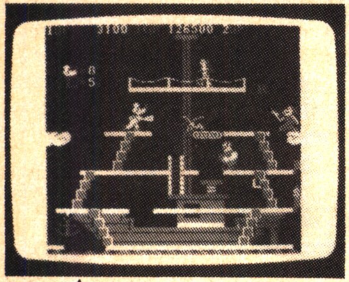
GAMES

THE SAILOR MAN

TAPE $29.95
DISK $34.95

The first screen objective is to catch enough of Elsie's kisses (those Red Heart Shaped Things) to fill in the squares on the Sailorman's house. If you can time your punch just so, you can send the punching bag over to knock the bucket down and, with a little bit of luck, right on **Bigfatbadguy's** head. This will give you a little (but not much) time to catch all those RHSTs.

You must avoid contact with **Bigfatbadguy** who is actively pursuing you. You must also be careful of **Olduglyseawoman** who will appear at higher difficulty levels to chuck empties at you. Either avoid the flying bottles or punch them (with the fire button) to keep from being knocked into the water.



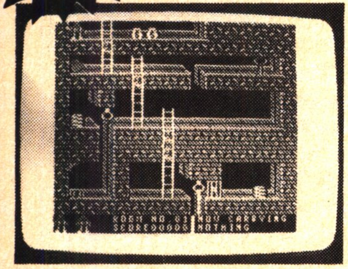
The second screen objective is to collect enough notes to play Elsie a little love song. You may jump off and onto the other end of **Fatguyeatinghamburger's** teetertotter to fly up a deck and even two decks if you manage to catch hold of **Smartaleckkid's** grab handles. Time it right and away you go.

The Third screen objective is to collect enough letters (thrown by Elsie's cries for H-E-L-P) to complete a ladder all the way to the crow's nest where Elsie is calling you. Beware of the Crow, however, who thinks you are after her eggs!

On all screens, eating a can of collard greens (labeled "S" for Collard and grasped by punching the can just right) will give you amazing speed, strength and ability and allow you to send **Bigfatbadguy** into the drink with a single punch.

NEW!

DRAGON SLAYER



Save the villagers of Pendor! They live in fear of Icarus, the blood thirsty dragon. The dragon lives in a cave, way up in the mountains. The cave is a treasure chest, full of gems and cashbags. The trail to the cave is as menacing as Icarus himself. You will have to secure the necessary equipment to climb the rocks and cross the rivers and chasms along the way. Be on the lookout for enemies and barriers at all times.

Tape $24.95 **Disk $29.95**

THE KING	**Tape $26.95**	**Disk $29.95**
SR-71	**Tape 28.95**	**Disk $31.95**
DRACONIAN	**Tape $27.95**	**Disk $30.95**
CU ∗ BER	**Tape $27.95**	**Disk $30.95**
SPACE SHUTTLE	**Tape $28.95**	**Disk $31.95**
FROG	**Tape $27.95**	**Disk $30.95**
CHAMBERS	**Tape $24.95**	**Disk $27.95**
TRAPFALL	**Tape $27.95**	**Disk $30.95**
KATER PILLAR II	**Tape $24.95**	**Disk $27.95**
WAREHOUSE MUTANTS	**Tape $24.95**	**$Disk $27.95**

NEW

UTILITIES

NOW! You can own the tools we've used to create "Donkey King", "Sailor Man", and others.

We are proud to announce our new utilities for the 64K Disk Color Computer, featuring.......

- **Full** use of 64K RAM • 100% Machine Language
- Parameters easily changeable in basic loader • No ROM calls
- "Cold start" exit to basic • Easy-to-read, informative documentation
- Keyklik • Selectable drive stepping rate
- Support 1-4 drives • Easy to use, with menu selected functions

To make life with your disks easier, may we suggest...

MAS — the finest assembler ever written for the Color Computer (includes EDT)..**$74.95 Disk**

EDT — effortless full (51×24) screen editing w/2 way cursor. Disk commands allow easy save/backup/append. Text files to 48K+. Copy, save, move, delete or print blocks. Much more...**$39.95 Disk**

The Deputy Inspector — Alphabetize, re-sort, and backup directory; **fast** 3-swap backups, copy files or programs to same or other disks, can autoreallocate granules during backup for **faster loading,** and more...**$21.95 Disk**

The Sector Inspector — Alphabetize, backup, and printout directory; repair crashes, LLIST basic programs, name disks, read in and edit 23+ grans, 3-swap backups, and more. Has 35-page manual and gran table print program...**$29.95 Disk**

NEW!

EDUCATIONAL

FACTPACK

FACTPACK is a set of 3 programs designed for home or school use. The programs provide drill and practice with basic addition, subtraction, multiplication and division facts and are appropriate in grades 1-6. Each program requires a 32K Extended BASIC Color Computer. Disk drive and printer are optional.

Requires 32 K Ext. Basic **Tape $24.95** **Disk $29.95**

TEACHER'S DATABASE II

Teachers' Database (TDB) is a program designed to allow a teacher to keep a computerized file of information about his/her students.

The program requires a 64K Color Computer and at least one disk drive. This completely revised program includes all of the capabilities of the original TDB plus many new features.

- Information on as many as 100 students, or more, may be in the computer at one time.
- Each student may have as many as 20, or more, individual items of data in his/her record.
- The program has many easy to follow menus.
- Records may be easily changed, deleted, or combined.
- Information about students may be numerical or text.
- Records may be quickly alphabetized or reordered based on their contents.
- Records may be sored by various criteria.
- A full statistical analysis of scores may be done and sent to the printer.
- Student test scores may be weighted, averaged, changed to a percentage or changed to a letter grade.
- Individual student progress reports and class gradebook sheets may be printed.
- Three methods of data entry spped the task of typing in student grades and test results.
- The program may be easily customized to work with any printer.
- Student seating charts may be created and printed.
- Graphs of student test results may be created using the computer's high resolution graphic screen.
- Grade distribution can be displayed numerically or as a histogram.

Requires 32K Ext. Basic **Tape $39.95** **Disk $42.95**

VOCABULARY MANAGEMENT

Requires 16K Ext. Basic or 32K for printer output.

The Vocabulary Management System (VMS) is a series of programs designed to aid a parent or teacher in helping children to learn and practice using vocabulary and spelling words. The 11 programs that comprise the VMS include a full feature data entry/edit program, three printer output programs and 5 vocabulary/spelling game programs. The system's many outstanding features include:

- As many as 300 vocabulary words and definitions may be in the computer's memory at one time.
- Words and definitions may be saved on disk or tape.
- Remarks and/or comments can be saved with word files.
- A disk loading menu allows students to load disk files without typing file names.
- Word lists may be quickly alphabetized.
- The three printer segments allow you to create and print individualized tests, puzzles, word-searches and worksheets.
- The printer segments allow full use of your printer's special features.
- The 5 game programs are based on sound educational principles and provide practice in identifying words and matching them with their definitions in a fast-paced set of activities.

TAPE $39.95 **DISK $42.95**

FRACTIONS - A Three Program Package

MIXED & IMPROPER

1. Review converting mixed numerals and improper fractions.
2. Practice converting mixed numerals to improper fractions.
3. Practice converting improper fractions to mixed numerals.
4. Practice of both types. (Mixed to improper & improper to mixed)
5. Review converting mixed numerals to mixed numerals. (Used in regrouping in substraction).
6. Practice converting mixed numerals to mixed numerals.

EQUIVALENCE

1. Definitions of terms and review of finding equivalent fractions.
2. Practice finding equivalent fractions.
3. Practice finding sets of equivalent fractions.
4. Review of dinding if one fraction is equal to, not equal to, less than or greater than another.

LOWEST TERMS

1. Review of placing fractions into lowest terms by dinding the greatest comon factor (GCF) of the numerator and denominator.
2. Practice finding the GCF of pairs of numbers.
3. Practice placing fractions into lowest terms by finding the GCF of the numerator and denominator.

32K EXT BASIC **TAPE $30.95** **DISK $35.95**

MATH DUEL

MATH DUEL is a challenging mathematics game that pits you against the computer in a game of wits. You must use all of your knowledge of factors, multiples and prime numbers to develop a strategy that allows you tog ather more numbers and thus more points than the computer.

The game is deceptively simple. you select the size of the playing field that is composed of from 8 to 100 numbers. You must then choose numbers that will give you the maximum number of points and the computer the least number of points. There are only 6 rules.

32K EXT. BASIC **TAPE $24.95** **DISK $29.95**

SIMULATIONS

P51 Mustang
Attack Flight
Simulator
JUST IMAGINE! Your movements are shown at any remote CoCo across town or across the country. It's hard to believe it's simulation.

P40 shown.

P51 Mustang

Attack Flight Simulator

Experience the ultimate video experience. For the first time ever, two computers can be be linked together with action and re-action at at either location, or play alone. The P-51 Mustang was the attack workhorse during WWII. To experience the flight of this beautiful plane in actual combat situation will give many hours of excitement. You can test your skill against the computer to defend your position or try your hand competing against your opponent at any remote location. Two CoCo's Two CoCo's can be linked by cable for **TRUE** two players adventure. With the use of a modem you can test your skill across town or across country!! This program is another first from Tom Mix Software. Order your excitement today. Direct cable available separately when two computers are used at the same location.

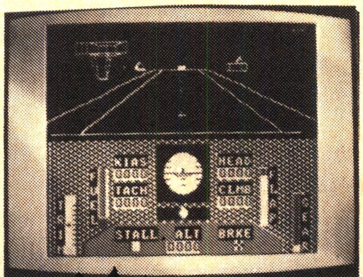
32K Machine Language Tape $29.95 Disk $34.95 Cable $10.95

Worlds of FLIGHT

Jump in the pilot seat - not a game - A realistic Flight Simulation

C.L. - "As a pilot I found "Flight" to be an outstanding simulation".

WORLDS OF FLIGHT (WOF) is a "view" oriented flight simulation for the TRS-80 Color Computer, written entirely in Machine Language. "View" oriented means that the pilot may determine his or her position by actually viewing the surrounding landmarks as opposed to using instruments which sense navigational references. This is a major departure from "instrument only" simulations which can be achieved through BASIC programs. Most instrument maneuvers and procedures may be practiced. The craft is a light-weight, single-engine airplane with low wings. A nose wheel which is both steerable and retractable is also modeled. Some aerobatics are possible including sustained inverted flight, aileron rolls, spins and stalls.



JOYSTICKS REQUIRED

32K MACHINE LANGUAGE

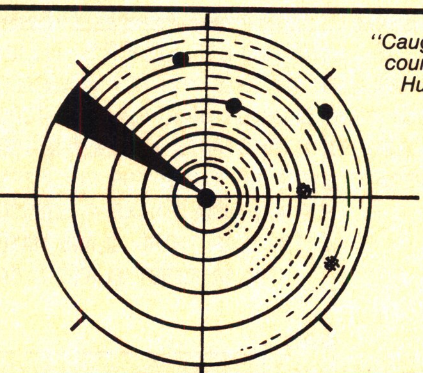
TAPE $29.95

DISK $34.95

NEW!

APPROACH CONTROL SIMULATION

From Betasoft Systems



"Caught in a blinding snowstorm, two jet airliners are on a collision course. The pilots are completely unaware of the immenent danger. Hundreds of lives are at stake. A high-speed disaster is inevitable unless you act fast . . ."

This and many other exciting scenarios await you as "Air Traffic Controller" with the APPROACH CONTROL SIMULATION. The thrills, challenges and frustrations you'll experience with this authentic, real-time simulation will lead to countless hours of discovery and adventure.

★★ A Complete Simulation Package ★★

- **Software on Disk or Tape**
- **Comprehensive Manual**
- **Quick Reference Guide**
- **No Joysticks Required**

32K MACHINE LANGUAGE TAPE $29.95 DISK $34.95

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MasterCard TO ORDER CALL 616/957-0444 VISA

Finally, the numbers 0 and 0 yield:

	0	FALSE
OR	0	FALSE
	0	FALSE

As you can see, this is all pretty easy to follow. I think there is a worldwide conspiracy among technically minded people to keep the rest of us confused. To follow the OR logic into larger numbers, let's try 15 and 10:

	1111	15
OR	1010	10
	1111	15

Notice that 15 OR 10 is 15. What about another number? How about 15 OR 8?

	1111	15
OR	1000	8
	1111	15

Hmmm, 15 OR 8 is still 15. In fact, 15 OR any number that isn't greater than 15 is 15. Now what could be the use of that? This ability to set a selected bit in a number is what makes OR useful. For instance, if you wished to set the first bit in an eight-bit number, use OR with the value of 10000000, or 128 decimal as in the following:

	01001111		11111111
OR	10000000	OR	10000000
	11001111		11111111

The most significant bit of the result is always set. If you wanted to use OR to set the most significant bit of the value in Register A, use the command line:

```
ORA #128
```

EOR

Exclusive OR logic is OR logic with a condition. The condition is that either of the two numbers under comparison can be true, but not both, in order for the result to be true. Thus, an exclusive OR of the numbers 1 and 0 is:

	1	TRUE
EOR	0	FALSE
	1	TRUE

If both numbers are 1, however, the result is:

	1	TRUE
EOR	1	TRUE
	0	FALSE

You have already seen the EOR logic in another column. In that instance we caused characters on the screen to toggle between upper- and lowercase by exclusive ORing their values with 64. Once a value is EORed with another value, you can regain the original value by repeating the process. For instance:

	0100001	decimal	65
EOR	0100000	decimal	64
	0000001	decimal	1

	0000001	decimal	1
EOR	0100000	decimal	64
	0100001	decimal	65

This example uses EOR to toggle between 65 and 1. No matter how many times you used EOR, the result would continually toggle between 65 and 1.

Thus, to determine the sign of a signed-bit number, EOR it with a value of 1000000. If the result is greater than 127 then the number must have been positive. If the result is less than 128, the original number was negative.

AND a Bit More

OR and AND can also be used to set or reset Condition Code bits. This information is for those of you who have gone on to learn about the condition code. The order of the bits in the condition code is:

Bit 0 = Carry Code
Bit 1 = Overflow Code
Bit 2 = Zero Code
Bit 3 = Negative Code
Bit 4 = IRQ Interrupt
Bit 5 = Half Carry
Bit 6 = Fast Interrupt
Bit 7 = State on Stack

To set the fast interrupt bit, use the command:

```
ORCC #64
```

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To set the zero code and the carry code bits, use:

```
ORCC #5
```

If you are not into manipulating the Condition Code yet, store in your mind the fact that it can be manipulated in this way. You will find it useful in the future.

Beyond *EDTASM+*

The logic given thus far covers the options available through *EDTASM+*. You really don't need any more, but I will mention some of the others so you can be familiar with the logic should you run across it in other languages.

NOR

NOR logic is OR logic that is reversed in the final stage. In other words, if the result of an OR operation is false, the same operation would give a result of true using NOR. For example:

	1 TRUE		0 FALSE
NOR	0 FALSE	NOR	0 FALSE
	0 FALSE		1 TRUE

NAND

NAND has the same relationship to AND logic that NOR has to OR logic. It reverses the normal result. The following examples show this:

	1 TRUE		0 TRUE
NAND	1 TRUE	NAND	1 FALSE
	0 FALSE		1 TRUE

NOT

NOT can be used in any logic operation to reverse the result of that operation. Whatever the normal result of the operation would be, NOT reverses it.

Truth Tables

Truth tables often accompany Boolean logic examples. A truth table is a chart showing all the possible results of the specified logic. For instance, a truth table for AND might look like this:

AND	**Bit 1**	**Bit 2**	**Result**
	0	0	0
	0	1	0
	1	0	0
	1	1	1

For OR, the table might look like this:

OR	**Bit 1**	**Bit 2**	**Result**
	0	0	0
	0	1	1
	1	0	1
	1	1	1

The End of the Mystery

I hope this has cleared any confusion about Boolean logic; it is simple and easy to use. When you see it in programs, you can easily calculate what it is doing by converting the values to binary and performing the operation yourself. When you run across truth tables, you will be able to see what they are about at a glance.

Go ahead, experiment! Put Boolean logic to work and see what George Boole has done for you.

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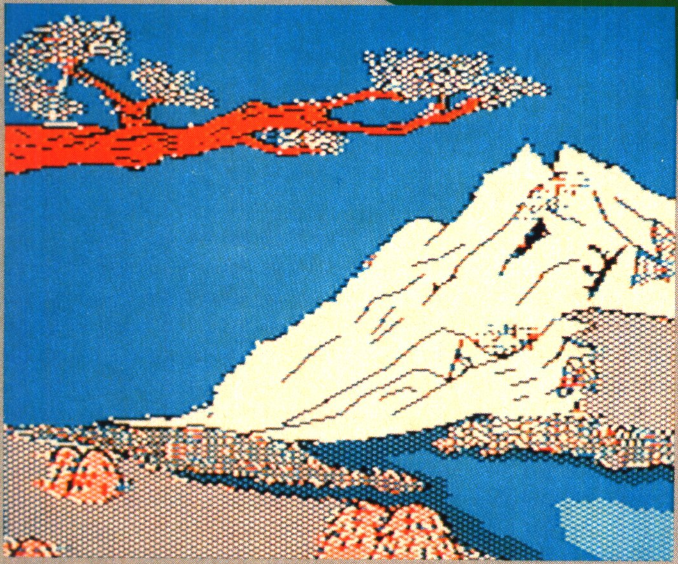
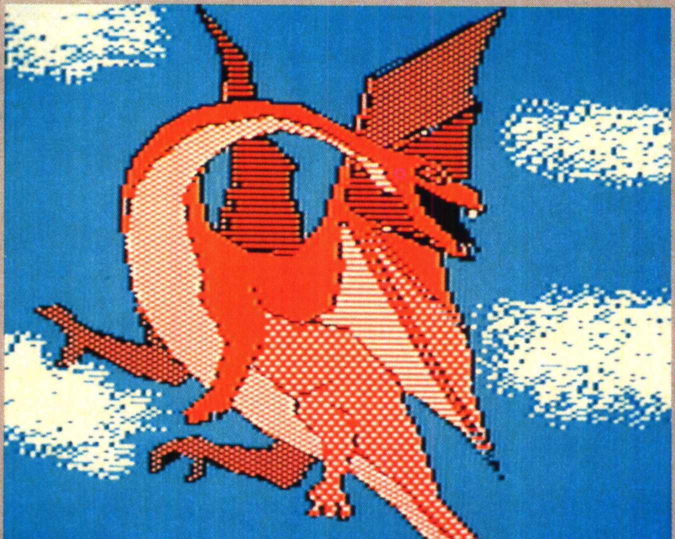


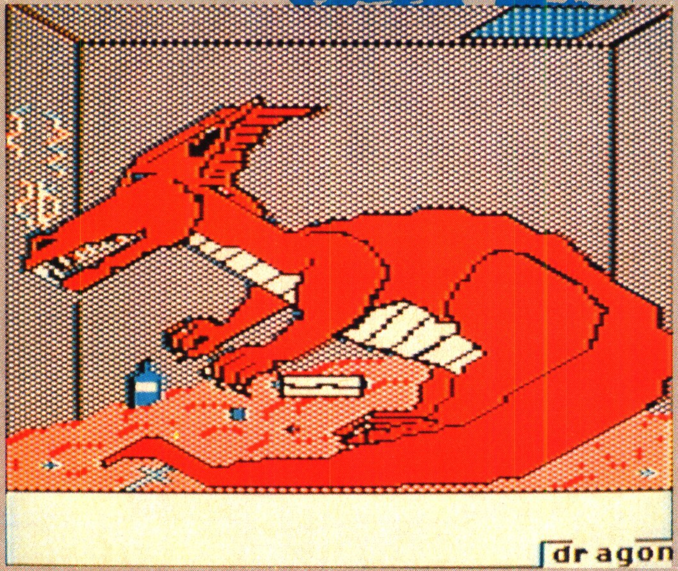
Chris Ahrendt
Japan
Chris lives in Waldorf, Md., and used *Graphicom I* and *II* to give the Gallery this tranquil, pastoral view of the homeland of the folks who gave us Godzilla.

2nd PRIZE



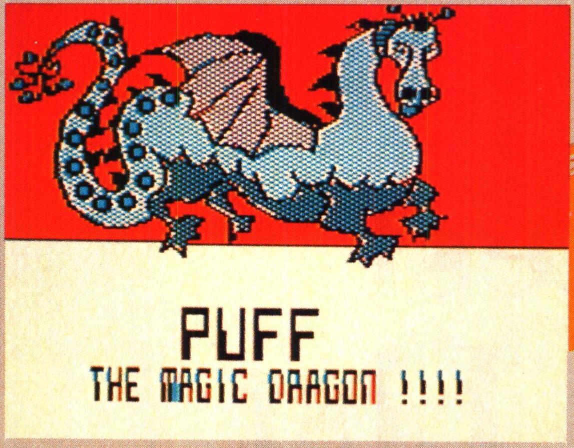
Charlie Fulp
Dragon
Charlie lives in South Boston, Va., and used *CoCo Max* and artifact colors to send the Gallery this dramatic dragon-on-the-wing reminiscent of Quetzalcoatl.

3rd PRIZE



Rick Herbert
Dragon In Lair
Rick used *Graphicom* to draw a cozy dungeon scene depicting his dragon relaxing at home. Rick lives in Crowley, La.

HONORABLE MENTION



R.G. Wright
Puff
Drawn with *Graphicom* and painted with *Graphicom II*, R.G.'s dragon displays the whimsical side of these mythical creatures. R.G. lives in Atwater, Calif.

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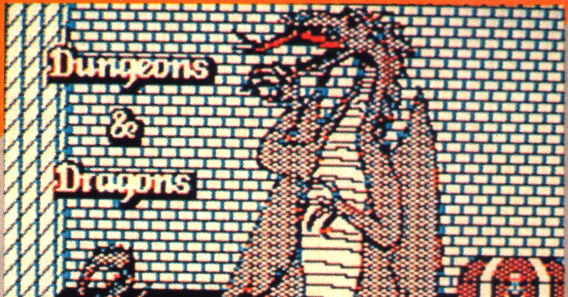

David Mattoon
D & D
David lives in Dannemora, N.Y., and used *CoCo Max* for this quintessential dungeon and dragon to round out the Gallery's pride of dragons.

Be sure to send a cover letter with your name, address and phone number detailing how you created your picture (what programs you used, etc.), how to display it and a few facts about yourself.

Please don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere.

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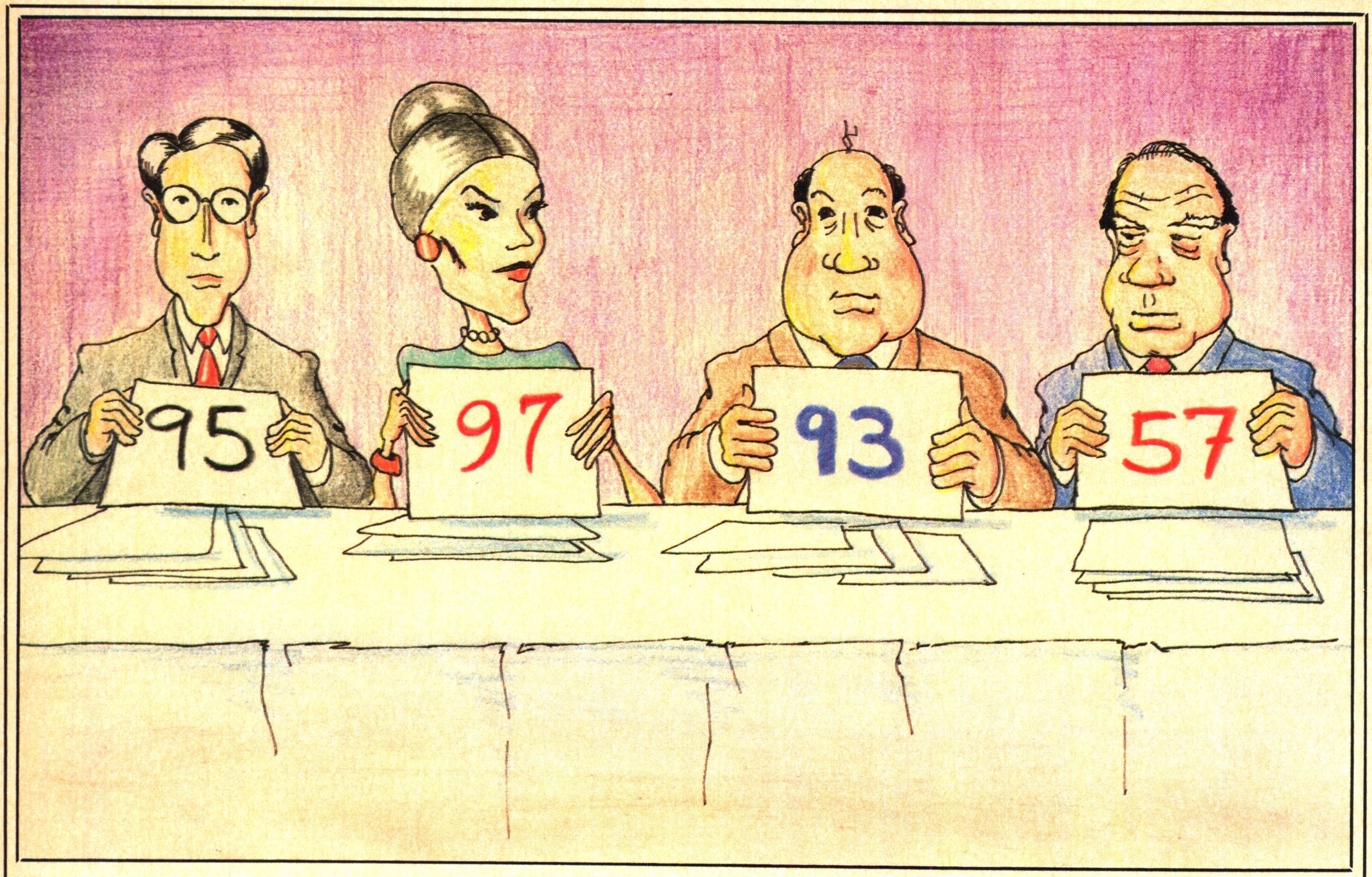

Contest Check List

By Howard Lee Ball

Speaking of contests, you can adjust this program to tally the totals for your own competition.

One of my favorite tasks during the past several years has been judging the local Optimist Club Oratorical Contest. I have always enjoyed listening to the young speakers as they extol the virtues of youth, of our country, of education or all three.

It is not easy to judge such a contest, but I think the Optimist Club has come up with a very fair rating system. My only problem with the whole process is the wait between judging and announcing the winners. The local club has bridged that gap by having a coffee break

---

(Howard Ball is an editor of a twice-weekly newspaper and a licensed minister. He is a frequent contributor to RAINBOW.)

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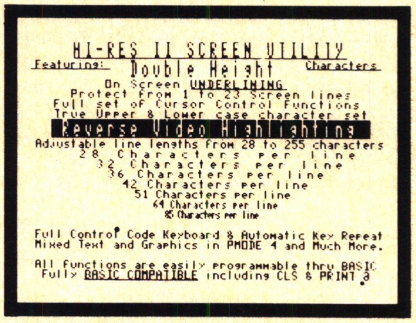

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Upper/Lower case characters	Yes	Yes	Yes
Mixed Text and Graphics	Yes	Yes	Yes
Separate Text & Graphics	Yes	Yes	No
Print @ fully implemented	Yes	Yes	Yes
Print @ on all line lengths	Yes	Yes	51 only
Different line lengths	28 to 255 (9)	28 to 255 (9)	51 only (1)
Automatic Key Repeat	Yes	Yes	Yes
Adjustable Key Repeat	Yes	No	No
Auto Repeat Disable	Yes	No	No
Erase to end of line/screen	Yes	Yes	Yes
Home Cursor	Yes	Yes	Yes
Solid or Blinking Cursor	Yes	No	Yes
CLS command supported	Buff/Black	Buff/Black	Buff/Black
X.Y Coordinate Cursor Positioning	Yes	Yes	No
Double Size Characters	Yes	Yes	No
Individual/Continuous Highlighting	Yes	Yes	No
On Screen Underlining	Yes	Yes	No
Clear Key functional	Clear/L keys	Clear key	No
16.32 & 64K Supported	Yes	Yes	Yes
Green or Black Background Color	Yes	No	No
Dual Character sets for Enhanced 64 and 85 Characters per line display	Yes	No	No
Protected Screen Lines (programmable)	1 to 23	No	No
Full Control Code Keyboard for Screen control directly from the keyboard	Yes	No	No
Programmable Tab Character Spacing	Yes	No	No
Full Screen Reverse Function	Yes	Yes	No
Switch to & from the Standard 16 by 32 Screen for full compatability	Yes	No	No
On Error Goto Function	No	No	Yes
Extended Basic Required	No	Yes	Yes
All Machine Language Program	Yes	Yes	Yes
RAM Required in addition to Screen RAM	2K	2K	2K
Program Price (Tape)	$24.95	$19.95	$29.95

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while the judges compile their data into a winning profile. I thought the CoCo could do the job — the result is *Oratory*.

Using the Optimist Club judging system as a guide, the program compiles point and place totals, and prints them out in a report. Using this information, the winners can then be determined.

Using CoCo, the process takes no more than a few minutes, then the judges can also get in on the coffee break! I have run the most recent contest scores through *Oratory* and it takes less than five minutes to input the data.

I built a few stops and checks into the program so you don't get ahead of yourself and input the wrong numbers. It is a very straightforward program and will operate on a small system.

It is printer-oriented, but you can change the `PRINT#-2,` to `PRINT` statements if you wish. I used the DMP-200 as the design model. You can change whatever you wish to suit your own particular configuration.

Oratory can be adapted to almost any contest. You can add penalties if you wish or change the number of judges. I originally designed the program with the ability to choose the number of judges, but since the normal number in an Optimist contest is three, I saved aggravation and set the number at three.

After you type in the program and save it to tape or disk, simply run and you are on the way to the tally — good luck, and enjoy your coffee break.

(If you do not subscribe to RAINBOW ON TAPE, I would be happy to make you a copy on tape for $5, or send a disk and I will copy onto it for $5. My address is 130 Romain Avenue, Pompton Lakes, NJ 07442.)

The listing: ORATORY

```
210 .......31
400 .......47
520 .......76
END ......39
```

```
10 CLS
20 PRINT@ 231,"ORATORICAL CONTES
T"
30 PRINT @ 266, "JUDGES' TALLY"
40 PRINT @ 296, "BY HOWARD L. BA
LL"
50 PRINT @423, "COPYRIGHT (C) 19
85"
60 FOR X=1 TO 1200
70 NEXT X
80 CLS
90 INPUT "NUMBER OF SPEAKERS";P
100 FOR C=1 TO P
110 PRINT"NAME OF SPEAKER ";C
120 INPUT A$(C)
130 NEXT C
140 FOR J=1 TO 3
150 FOR C=1 TO P
160 CLS:PRINT "JUDGE ";J;" SCORE
 FOR CONTESTANT";C
170 INPUT "PERSONAL QUALITIES(20
 POSSIBLE)";PQ(C,J)
180 IF PQ(C,J)>20 GOSUB 600 ELSE
```

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```
 GOTO 200
190 GOTO 170
200 INPUT "MATERIAL ORGANIZATION
 (POSSIBLE 30)";MO(C,J)
210 IF MO(C,J)>30 GOSUB 600 ELSE
 GOTO230
220 GOTO 200
230 INPUT "DELIVERY AND PRESENTA
TION(30 POSSIBLE)";DP(C,J)
240 IF DP(C,J)>30 GOSUB 600 ELSE
 GOTO260
250 GOTO230
260 INPUT "OVERALL EFFECTIVENESS
(20 POSSIBLE";OE(C,J)
270 IF OE(C,J)>20 GOSUB 600 ELSE
 GOTO 280
280 INPUT"ARE SCORES CORRECT";A$
290 IF A$="N"THEN 160 ELSE CLS:G
OTO 300
300 INPUT "ARE THERE ANY PENALTI
ES";A$
310 IF A$<>"Y"THEN 380 ELSE320
320 INPUT "PENALTY FOR USE OF PR
OPS ETC ";PP(C,J)
330 INPUT "PENALTY FOR SELF-IDEN
TIFICATION";SI(C,J)
340 INPUT" SECONDS OVER OR UNDER
OFFICIAL LIMIT";OT(C,J)
350 INPUT"FAILURE TO ANNOUNCE SU
BJECT (3 POINTS)";FA(C,J)
360 INPUT "ARE PENALTIES CORRECT
";A$
370 IF A$<>"Y" THEN320 ELSE 380
380 OX(C,J)=INT(OT(C,J)/15)
390 PY(C,J)=OX(C,J)+PP(C,J)+SI(C
,J)+FA(C,J)
400 TP(C,J)=PQ(C,J)+MO(C,J)+DP(C
,J)+OE(C,J)-PY(C,J)
410 INPUT"JUDGE PLACED CANDIDATE
";PL(C,J)
420 FP(C)=PL(C,1)+PL(C,2)+PL(C,3
)
430 IF C=P THEN 450
440 NEXT C
450 IF J=3 THEN GOTO 480
460 NEXT J
470 PRINT J;TAB(4);A(J)
480 PRINT#-2,CHR$(27)CHR$(14)"
 ORATORICAL CONTEST COMPUTER REP
ORT";CHR$(27)CHR$(15)
490 PRINT #-2,STRING$(80,61)
500 PRINT#-2,TAB(4) "CONTESTANTS
";TAB(18)"FIRST JUDGE";TAB(31)"S
ECOND JUDGE";TAB(46)"THIRD JUDGE
";TAB(60) "TOTAL";TAB(67)"TOTAL"
510 PRINT#-2,TAB(4)"SPEAKING";TA
B(18)"POINT";TAB(31)"POINT";TAB(
46);"POINT";TAB(60)"POINT";TAB(6
7)"OF"
520 PRINT#-2,CHR$(15)TAB(5);"ORD
ER";TAB(19)"GRADE";TAB(26)"RANK"
;TAB(32)"GRADE";TAB(39)"RANK";TA
B(47)"GRADE";TAB(54)"RANK";TAB(6
1)"GRADES";TAB(68)"RANK";TAB(76)
"PLACE"
530 FOR C=1 TO P
540 PRINT #-2,CHR$(14);TAB(4);A$
(C);TAB(18);TP(C,1);TAB(25);PL(C
,1);TAB(31);TP(C,2);TAB(38);PL(C
,2);TAB(46);TP(C,3);TAB(53);PL(C
,3);TAB(60);TP(C,1)+TP(C,2)+TP(C
,3);TAB(67);FP(C);TAB(75);""
550 NEXT C
560 PRINT#-2,STRING$(80,42)
570 PRINT #-2,"WINNER IS DETERMI
NED BY LOWEST TOTAL RANK FIRST.I
F THERE IS A TIE THERE THEN     T
HE WINNER IS DETERMINED BY THE H
IGHEST TOTAL POINT GRADE. NO TIE
S ARE PERMITTED"
580 INPUT "ANOTHER COPY <Y> OR <
N>";Y$
590 IF Y$="Y" THEN 480 ELSE END
600 PRINT "SCORE TOO HIGH ENTER
AGAIN"
610 RETURN
```

SOFTWARE

Color Computer MACHINE MONITOR - professional software and manuals published by R. C. I.
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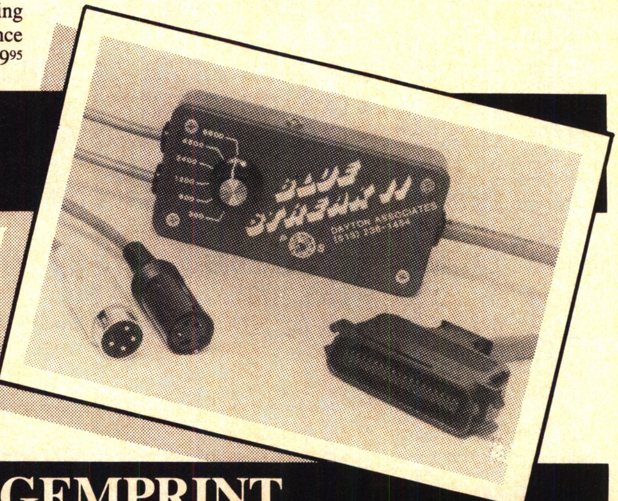

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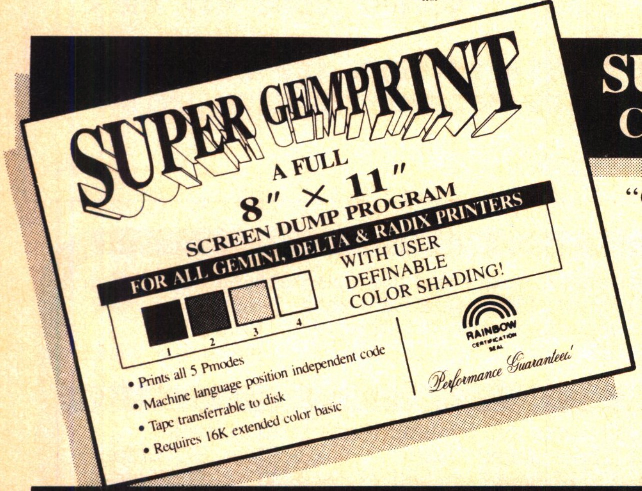

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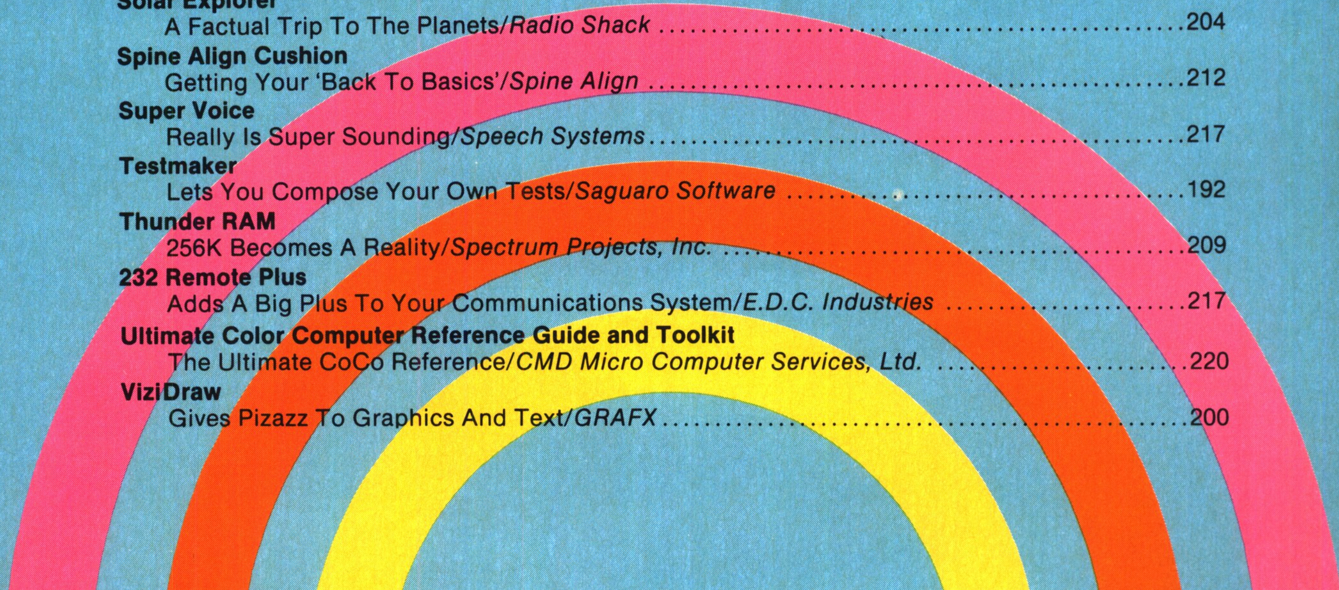

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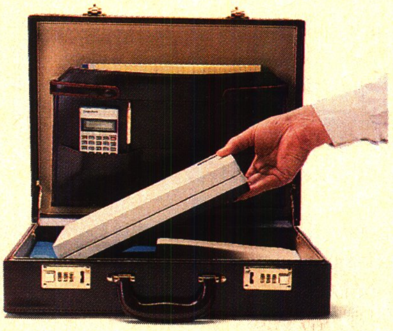

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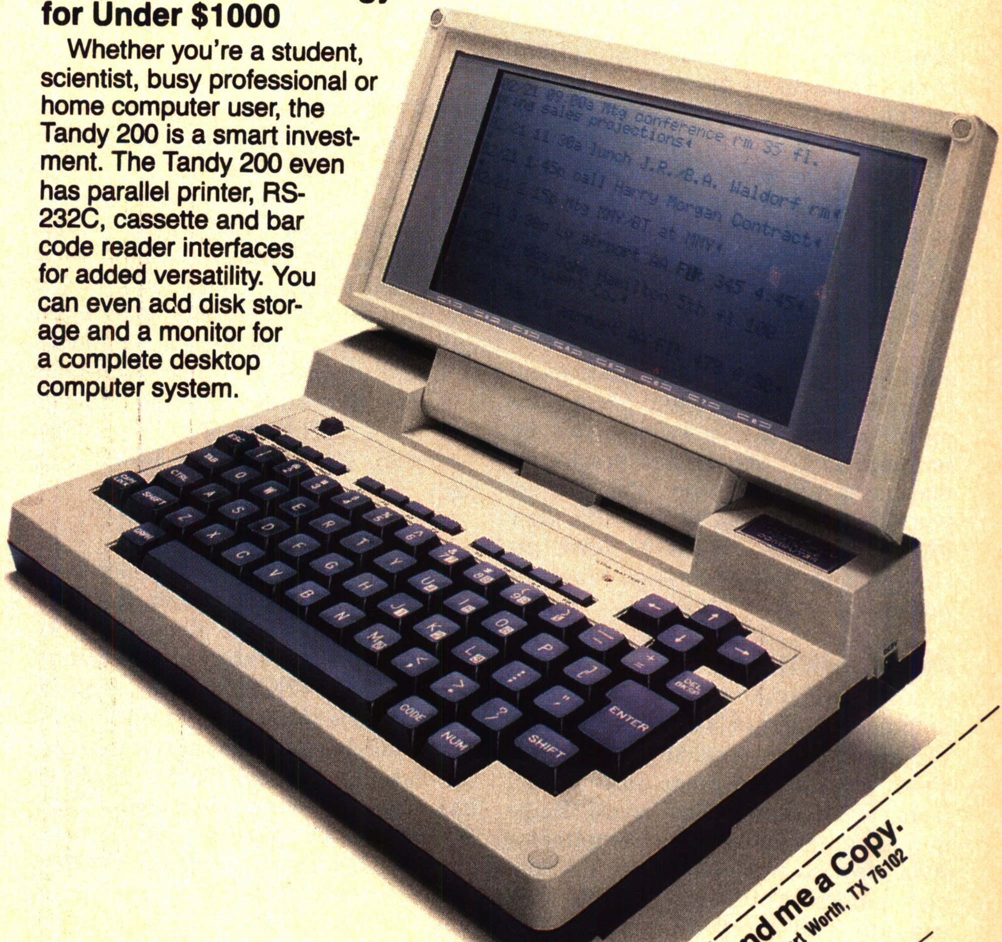

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The following products recently have been received by THE RAINBOW, examined by our magazine staff and approved for the *Rainbow Seal of Certification*, your assurance that we have seen the product and have ascertained that it is what it purports to be.

This month the *Seal of Certification* has been issued to:

Little Letters, a 32K ECB education program requiring a disk drive. Designed to assist preschoolers in distinguishing lowercase letters from uppercase with use of medium resolution graphics. Bob's Software, P.O. Box 391, Cleveland, OH 44107, disk no charge with self-addressed, stamped mailer

Master Disk, a 32K Disk BASIC utility to make a directory program which will accept up to 250 filenames or the directories of up to 18 disks. The program then sorts the filenames in alphabetical order and will save them in a disk file and/or display them on screen. Bob's Software, P.O. Box 391, Cleveland, OH 44107, disk no charge with self-addressed, stamped mailer

SKANCE, a 16K ECB disk dice game for up to four players. Solo players are pitted against CoCo (which can be beaten). CoCo scores and tracks all players as you test your skill and try your luck. Bob's Software, P.O. Box 391, Cleveland, OH 44107, disk no charge with self-addressed, stamped mailer

ChesSD, a 64K chess game requiring a disk drive utilizing a Hi-Res mode graphics to accurately depict the board. Players can set or change the look-ahead level at any point during play, from novice to advanced levels. Built-in time control allows true tournament-style play, as well as "Rapid Transit" play modes. Computer Systems Distributors, P.O. Box 9769, Anaheim, CA 92802, disk $49.95 plus $2 S/H

Microartist, a 32K ECB graphics utility requiring a joystick or mouse featuring: load/save files, zoom/mode textures, copy, printout and 100 color combinations. Prickly-Pear Software, 2640 N. Conestoga Avenue, Tucson AZ 85749, cassette $24.95, disk $29.95

SDOS, a 64K fully interrupt driven operating system including support for four drives, disk buffer pool, LRU cache, recovery utility, user-definable error messages, full ASCII keyboard selectable Baud rates and over 400 pages of documentation. Computer Systems Distributors, P.O. Box 9769, Anaheim, CA 92802, disk $49.95 plus $2 S/H

SEDIT/TYPE, a 64K word processing utility requiring a disk drive and *SDOS*. *SEDIT* has a full-screen text editor with typeahead and autowrap on margin, "no wrap" mode for programs and global search/change. *TYPE* is a document processor with multiple file merge table of contents generator, automatic page numbering, justification and pagination. Comes with over 150 pages of documentation. Computer Systems Distributors, P.O. Box 9769, Anaheim, CA 92802, disk $49.95 plus $2 S/H

Super Cosmos Connection, a serial to parallel converter with buffer. Features include: 110 to 19,200 Baud, 7- or 8-bit; 8K bytes standard buffer which is expandable to 32K in 8K steps; modem switch and cables; compatibility with any parallel printer; and power pak and instructions. Cosmos Computer Services, Inc., 620 Stuart St., Green Bay, WI 54301, 8K version $129.95, 16K version $144.95, 24K version $154.95, 32K version $169.95

Corporation Plus, a 32K ECB arcade-style game of skill, strategy and luck. Up to seven players may buy and sell corporations, invest in the stock market, buy lottery tickets, lose or gain capital or go bankrupt. Diamondstar Software, P.O. Box 21580, St. Petersburg, FL 33742, cassette $24.95 plus $2.50 S/H

Cash Prophet, a 16K ECB budget utility able to make week-by-week forecasts for one checking account and two savings accounts through input of current balances, interest rates and schedule of projected income and expenses transactions. Everyone's Computer Co., P.O. Box 771-R, Chesterfield, MO 63017, cassette $39.95

NAUGUS 2.0, a 16K arcade Adventure wherein you, as Byron Axehead, former captain of the King's Border Legion, must find the magic scepter to extricate yourself from a death sentence. The scepter is hidden in a magic forest populated by foul monsters who serve the dreaded Naugus. Freebooter Software, P.O. Box 59537, Pittsburgh, PA 15210, cassette $17.95

Model CC-150 Experiment Component Package for the TRS-80 Color Computer Interface Breadboard, includes 16 ICs, a peripheral interface adapter, one D/A converter and one A/D converter, a binary switch and assorted resistors, capacitors and connectors. With the **CC-Interface Board**, hackers can do the experiments in Andrew C. Staugaurd's book *TRS-80 Color Computer Interfacing, With Experiments*. Group Technology, P.O. Box 87, Route 1, Box 83, Check, VA 24072, Component package $89.95 plus $2.50 S/H, Interface Board $51.25 plus $2.50 S/H

Submarine Subtraction, a 32K ECB education tutorial designed to aid elementary grade students in the use of subtraction. Consisting of 10 levels of difficulty from one digit to four digits, the player is asked to solve the problem within a given time frame thereby firing a torpedo at a battleship. Incorrect answers or going over the time frame result in the battleship dropping a depth charge. M.E.S.A., Middletown High School, Valley Road, Middletown, RI 02840, cassette $24, disk $26 plus $2.50 S/H

The Wizard's Math Board, a 32K ECB educational game for one to four players. Each player can choose his or her own level of play. The object of the game is to move around the board earning money by solving word problems or operational problems. Players earn money to buy three keys and the opportunity to try and solve the wizard's final riddle. M.E.S.A., Middletown High School, Valley Road, Middletown, RI 02840, cassette $20, disk $22 plus $2.50 S/H

Young Writer's Notepad, a 32K ECB word processing program to acquaint young writers with the computer keyboard. Possible are single key selections for any one of three colors and printouts in any one of three styles. Advanced writers can access a function menu to save and load documents from disk or tape. Features include an upper- and lowercase character set and special characters, full cursor control and insert and delete functions. M.E.S.A., Middletown High School, Valley Road, Middletown, RI 02840, cassette $20, disk $22 plus $2.50 S/H

MORE KEYS, a numeric keypad for CoCo with 15 keys that plugs into the computer for rapid numeric data entry. Dimensions: 6½-inch length, four-inch width and three-inch height. You must specify computer model when ordering. Comes with cable and connector. Moreton Bay, 316 Castillo Street, Santa Barbara, CA 93101, $69.95 plus $2 S/H

LABEL 64, a 64K utility to produce and maintain a name and address file. Records are stored on tape with options to add, delete, modify, search, list to screen, sort and/or print as desired. Users can print lists or labels in a choice of one, two or three wide. Owls Nest Software, P.O. Box 579, Ooltewah, TN 37363, cassette $24.95

Property Management and Report System, a 32K real estate utility program requiring a disk drive and printer. Reports possible include: income and expenses by unit, tenant or property, rent and mortgage schedules, tenant and property profiles and any combination of single and multiple units. A function for printing mailing lables is also included. Polygon Co., 1316 Wilshire Blvd., Suite 206, Los Angeles, CA 90017, disk $99.50

City War, a 16K strategy game wherein the player must eliminate the leader of the opposing country by reducing the population of the leader's city to zero. Commands are accessed by a single keystroke. There are access codes to keep information: "Top-Secret: Your Eyes Only." Prickly-Pear Software, 2640 N. Conestoga Avenue, Tucson, AZ 85749, cassette $24.95, disk $29.95 plus $1.50 S/H

Protector, a write-protect program to make almost any program safe from unwanted examination. Racine, 5220 S. Birmingham, Tacoma, WA 98409, cassette $25

SDBASIC Compiler, a 64K utility requiring a disk drive with full-featured language, fast execution, automatic runtime integer, floating point optimization and device-independent ASCII and binary file I/O to the byte. Computer Systems Distributors, P.O. Box 9769, Anaheim, CA 92802, disk $49.95 plus $2 S/H

WINCO Board, a cassette utility hardware kit that uses LED monitors for tape head realignment for facilitating `CLOAD`s with reluctant cassettes. Possible are saving and load simultaneously, audible signal while saving or loading and finding optimum tape volume for loading. Russell Electronics, RD1, Box 539, Centre Hall, PA 16828, Unit assembled $24.95, build it yourself kit $20.95, earphone $1

Blackjack Dealer and **Feeler Dealer**, a 32K ECB blackjack game wherein you play against CoCo, the dealer. With *Feeler Dealer* you have a chance to hone your skill and test strategies by playing the desired number of hands using various techniques. Saguaro Software, 7331 E. Beverly, Tucson, AZ 85710, cassette $24.95, disk $29.95 plus $1 S/H

Marooned, a 32K graphics Adventure requiring a disk drive. The scenario: While minding your own business, a UFO lands nearby. You approach and see the hatch open revealing an empty interior. You step inside, the hatch springs shut and the ship takes off. You must find your way back home. Saguaro Software, 7331 E. Beverly, Tucson, AZ 85710, disk $29.95 plus $1 S/H

CoCo Checkbook Disk, a financial utility for disk drive owners to keep track of checking and savings accounts. Features include: Display Checking; Search Checking; Display Savings; Display Balances; Print a Check; Print Listings; Edit, Delete or Enter New Listings; Save Data; and Help. Spectrum Projects, Inc., P.O. Box 21272, Woodhaven, NY 11421, disk $39.95 plus $3 S/H

Telepatch, a 64K enhancement disk for *Telewriter-64* disk version. New features include: True block move, Visible carriage returns, Key beep, Key repeat and overstrike mode. Spectrum Projects, Inc., P.O. Box 21272, Woodhaven, NY 11421, disk $19.95 plus $3 S/H

Christmas Fantasia, a 64K sound and graphics program designed for use with Speech Systems' *Stereo Pak* featuring Christmas pictures of poinsettias, candles and reindeer among other scenes while playing favorite Christmas carols. Speech Systems, 38W 255 Deerpath Rd., Batavia, IL 60510, cassette or disk $19.95

CoCo Life, a 16K ECB one player game based on John Conway's "Life" board game. A checkerboard-like grid is filled with living and nonliving squares that proliferate or decline according to rules, creating a continually changing symmetry. Tothian Software, Box 663, Rimersburg, PA 16248, cassette $19.95

GoldKeys, a 64K ECB keyboard enhancement. Features included a nondestructive cursor, input editing, key klick, key repeat, predefined and user-definable function keys, typeahead keyboard buffer, and BREAK and Reset controls. VIDTRON, 4418 E. Chapman Ave., Suite 284, Orange, CA 92669, cassette $20, disk $22 plus $2 S/H

The *Seal of Certification* program is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the product does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW's reviewers for evaluation.

— Monica Dorth

REVIEWING REVIEWS

WORD PROCESSOR

Editor:

My thanks to Michael Hunt for the excellent review of *Word Processor* (May 1985, Page 202). I appreciate his fairness to smaller companies as well as large ones. I would also like to attempt to explain or defend some negative points he mentioned.

I admit the edit mode in this program is somewhat slow in scrolling through a file. Since this is a BASIC program, I'm not sure if it can be sped up very much, but I'll try. On the slow formatting of text, this was sped up about 20 percent in late 1984 (after *Word Processor* was sent in for certification).

Of the tape filename and motor control problems you mentioned, only one of these really needs to be fixed. The program can easily be changed to allow input of your own filename (I will have this done before this letter is published). As for the motor (and audio) of the tape being turned on before cassette input/output, this is to allow the user a way to find his or her program on tape before pressing ENTER. The reason behind this stems from *EDTASM+*, which does the exact opposite. After a user request to save, load, etc., to tape, *EDTASM+* prints "READY CASSETTE" and waits for the ENTER key. However, it doesn't turn the motor or audio on, so there is no way to "ready cassette"! I thought this might be useful.

The 5,000 character file limit has also been raised. Thanks again for the great review and my chance to respond to it.

André Needham
Drayon Software

TO PRESERVE QUANDIC

Editor:

Thank you for the review of *To Preserve Quandic* published in the July 1985 issue of THE RAINBOW (Page 223). Mr. Shell's review was fair and I appreciate his error trapping, but I would like to expand on a few statements that he made.

In previous reviews, I had noticed the reviewers would contact the author of the program and tell him of any obvious errors that had been found. If Mr. Shell had contacted me, I would have been more than happy to correct any of those errors. The program as Mr. Shell writes, is over 70K long and the data (text, not pictures) occupy another 30K of the disk. This results in a little over 100K of Adventure which I had to check over. I knew I missed some errors and I invite everyone who owns the Adventure to inform me of them. (My address is 1809 Dexter, Austin, TX 78704.)

Secondly, I would like to write about his "most critical point." Mr. Shell writes, ". . . you must fight or kill something and the winning or losing of these fights is random." This is true if the player cannot find certain objects or solve certain puzzles. If the player can do these specific tasks, he can pass the object he "must kill or fight" without killing or fighting.

Besides the things that Mr. Shell mentioned, there is the look and the feel of the Adventure. The screen is composed of five elements: 1) a timer which shows elapsed time, 2) a window for graphics, 3) a title for the graphics window, 4) an inventory window and 5) an interactive text window.

Also, there are the settings of the Adventure. They are a mansion which you are temporarily trapped in, a cave, a forest that you must find your way out of, and an old abandoned castle (not necessarily in that order).

In conclusion, I would like to thank THE RAINBOW for its service to the Color Computer users. Initially, in 1983, I benefitted from the programs and that is where I learned BASIC. Later, the articles on assembly language became more important. I am using that knowledge to write my next Adventure entirely in assembly language with a full sentence parser.

David Karam
Prickly-Pear Software

SS-1 ELECTRA-GUARD

Editor:

[It was a] very nice review regarding our surge suppressor (June 1985, Page 210). Gabe Weaver will be pleased to know it is both UL and CSA listed. Cassette-based Color Computers don't really mind surges and spikes on the line. But, once a disk is added, that same interference is magnified many fold and causes lost data, disk crashes, ruined directories and hung-up computers.

Adding the SS-1 to the circuit (the power doesn't have to flow through it, just being in parallel does the trick) reduces the garbage that causes these problems. Maybe the easiest way to "see" this is to use it in the same circuit as your TV, then turn on a hair dryer. Normally you would see the interference on the TV — but not with the SS-1 in place.

Ross Litton
Howard Medical Company

LEDGER ONE

Editor:

I have received a courtesy copy of Dan Smith's review of our Color Computer program, *Ledger One*.

Mr. Smith has made a fair and thorough analysis and review of *Ledger One*, offering a number of useful suggestions for improving the program.

All of his suggestions were found good and valued, so now have been made part of the newly modified program. The program instructions also are being rewritten.

Thank you for having an accountant review this accounting program, giving all of us the advantage of his knowledge and experience.

Thank you, RAINBOW Magazine, for the service you are giving to your readers.

Charles E. Brown, Jr.
West Bay Company

COLOR TERM + Plus +

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- Half, Full Duplex or Echo
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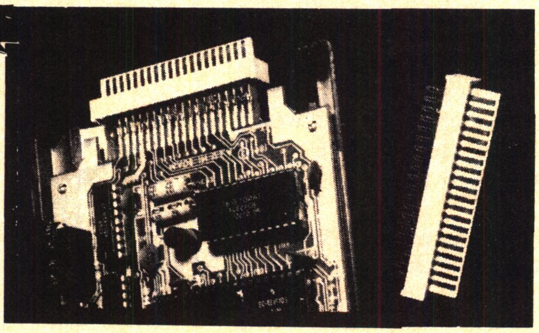

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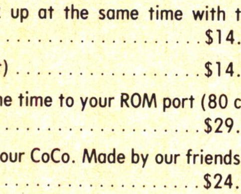

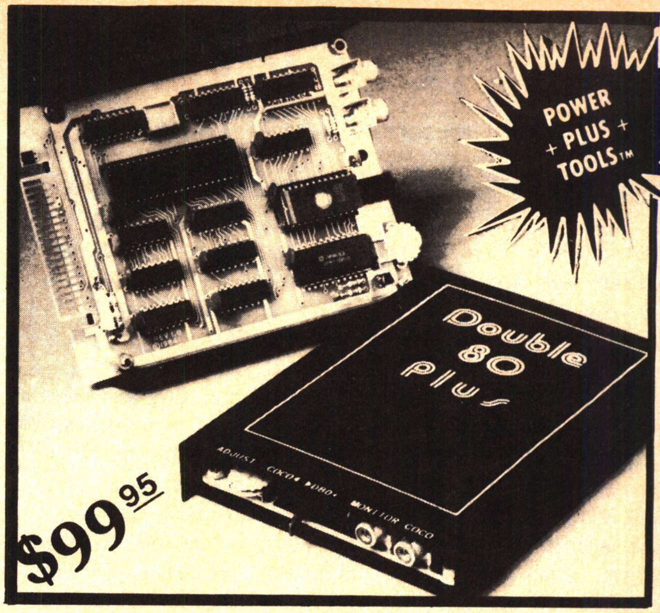

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RATE 6,35 ... change the head stepping rate.
VIDEO ON/OFF ... reverse video without a hardware mod.
SCROLL 1-255 ... change your screen scrolling speed.
COMMAND ... will list all new commands.
DUPE 0,1,2 ... will allow copy & backup from one side of a drive to another!
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Testmaker Lets You Compose Your Own Tests

Testmaker is one of those "good news/bad news" situations: you are tempted with praise for the program ("Just what I'm looking for"), then exposed to the harsh realities ("You mean it doesn't do . . . "). First, the good news.

Testmaker does just what it purports to do — create either true/false or multiple-choice tests of any number of questions, and either print them out or display them on-screen. If the test is printed out, a master (key) or a student version can be chosen. If the test is to be given by the computer on-screen, the test is scored by the computer and the results are displayed at the end, with the number correct, number wrong and the percentage of correct answers given.

A nice feature is the scrambling of the multiple-choice answers each time a test is run by the computer or printed out. The questions will appear in the same order each time, but choices will always be in different order. This allows a test to be used more than once with the same student, or for multiple versions of the same test to obviate cheating.

The program works smoothly, is supported by clear documentation and even has audible warnings when you near the end of the allowable length of questions (160 characters) or answers (29 characters). It works with either single or multiple drives, and follows good programming practices by always putting data files on a different disk than that which holds the program.

On single drive systems, this requires some disk swapping, but you are always reminded of this on-screen, and it doesn't happen too often. On multiple drive systems, you may specify which drive (other than the one holding the program disk) will hold the data disk. The program is not copy-protected, so backup copies are not a problem.

Now for the bad news. This program is cumbersome to work with in several ways. Once a file of questions is created, you cannot add to or delete from it. If you forget a question that really needs to be included, you must type the entire test again as a new file. Likewise, if you prepare a test in advance and later need to delete something you didn't get to in class, you must type the entire test again as a new file. You cannot merge two files to create a longer test, nor can you specify selected questions to be printed to create a shorter test.

Another problem is confined to the on-screen version of the tests created by this program. The test questions remain on the screen for six seconds, then are replaced by the answer choices. There is no way to see the question again. This can be very frustrating to a slow reader. This problem generated the most negative comments from students and adults looking at this program in action. (Of course, this can be corrected easily by someone with minimal programming skills, but you don't buy programs to create more work for yourself.) These are the most serious shortcomings of *Testmaker*.

The other problems are more on the order of annoyances than flaws, but they occur whenever the program is used. You can edit an error while you are on that line, but once you leave the line, you cannot edit until you finish the entire test. You then reload the file, read through each question, indicate if you wish to edit it, go on to the next question and so on through the entire file. You then go back and work with the questions you marked for editing. It would be much simpler if the user was able to edit each question as it scrolled through the file, instead of a two-step process.

Another problem is that when you are editing a question or answer, the incorrect entry disappears as soon as you type the first letter of the corrected answer. You are then asked "Is this correct?" but you can only see the last part of what you typed. It would be better, in view of the cumbersome editing technique, if everything you typed stayed on the screen until you pressed the ENTER key.

Although each question can be up to 160 characters long, each line can only be 32 characters long. You must use the down-arrow key to go to the next line on the screen. If you don't, the beginning of the the line you are on is lost. It is much more natural to type until you finish the question, but if you do, you will have only the last 32 characters you typed. Those audible warnings mentioned earlier are very useful here, but pressing the down-arrow every 32 characters can break your rhythm if you compose at the keyboard.

A related problem is the length of allowable answer. This is 29 characters. For some applications, such as names or dates, this will be adequate, but for others (alternate descriptions of a character in a novel, for example) it imposes a severe restriction. Of course, in the true/false option, this is not a problem.

None of these problems prevent the program from working, but they make the use of *Testmaker* less pleasant than it could be. There are other test-making programs on the market that do the job in a more flexible and efficient manner. *Testmaker* could be used in a home situation (where its inconveniences would not be too bothersome), but I would think twice before recommending it to a teacher for class use.

(Saguaro Software, 7331 E. Beverly, Tucson, AZ 85710 disk only, $29.95)

— Mark Williams

Hint . . .

Junk Eraser

Here's an easy way to prevent many cassette I/O errors. Position the tape at the point where the program is to be saved, and press the Record and Play keys. Estimate the length of the save, then enter `MOTOR ON` to start the tape and `MOTOR OFF` a few seconds after you expect the save to end. Rewind the tape to the desired position and `CSAVE` as usual.

This will erase any unwanted junk on the tape, making I/O errors less likely to occur.

Dan Rowe
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- Un-DISK should be in the library of every serious CoCo user even if you own a disk says Frank J. Esser, independent reviewer for RAINBOW Magazine!

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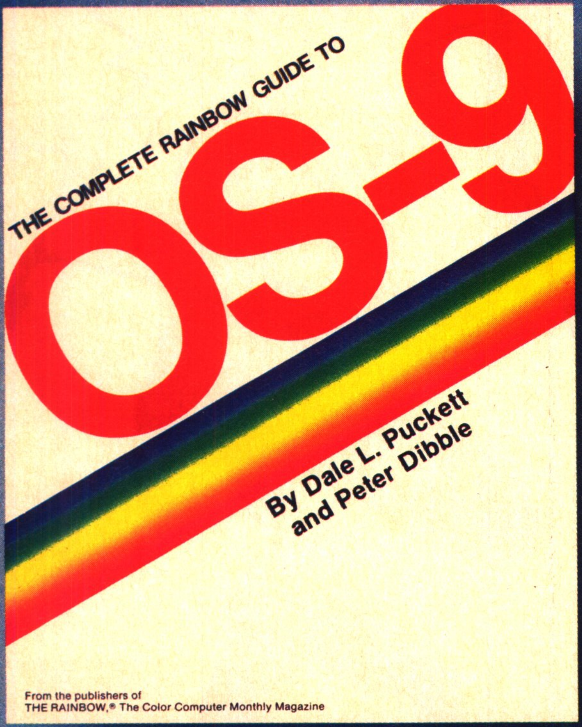
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Cookbook Takes The Cake With Its Menu Planning

From the moment I got my review package of Radio Shack's program *Cookbook*, I have been eager to tell you it is menu oriented — in more ways than one. It operates from a menu to make a menu.

Typical of other Radio Shack programs, *Cookbook* does not take some of the CoCo's real strengths into consideration, but it is very good in spite of a couple of shortcomings. If you have any knowledge of programming you can make up for some of the loss. For instance, you can break the program at one point and `POKE 150` to change the Baud rate for printing.

The package is slick! The very nice documentation is nested in a plastic folder with the two disks provided. One of the disks is the program and the other the data disk. You are better off with two drives for this program, but you can do with one if that is all you have. You can get along without a printer, but it will help to have one.

Let's take a look at how the program works. It starts with the usual billboards, disclaimers and then the question of how many drives you have. From there the program goes to the main menu which gives you the option of Menu Planner or Recipe Index.

Here is one of the very special features of this program. The selection in the menu is made by using the space bar; operating the program is accomplished by keying ENTER. These things are presented in very nice graphics, including a spiffy-looking chef.

To get down to business, I pushed the Create a Meal selection that produced a questionnaire. From this you can make a selection to produce four menus from which you can prepare meals. I chose Informal Lunch with an emphasis on meat dishes. The meal was to be light and the cost inexpensive.

On my 64K CoCo the disks started to whirl and clank and the message file search in progress came upon the screen. I timed the procedure and found the search took two minutes 50 seconds to discover 170 recipes. For the next two minutes, the program sorted the recipes and came up with four menus as follows: Carrot Soup, Omelet Fine Herbs, Spinach Souffle, Avocado and Tomato Salad; Golden Mushroom Soup, Barbecued Chicken, Corn Souffle, Goat Cheese Salad; Velvet Consomme, Chicken and Walnut Salad, Peas Francaise, Tomatoes Dijon Vinaigrette; and Tomato Madiera Soup, Chicken Cordon Bleu, Potato and Spinach Puree, Greek Salad. (Not exactly a hamburger with onion and an order of french fries!)

I then went back to the main menu to access the Recipe Index. I chose the retrieve recipe selection. I was greeted by splendid graphics which asked what recipe I needed. I input the words "Chicken Cordon Bleu." About 15 seconds later the recipe was put together and I was able to scroll through in less than a minute.

After the recipe scrolled through, graphics came on the screen and the legend said "the chef will be back." When he came back it was in the form of a menu which gave the options of Scroll through the recipe, Print out the recipe,

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Create a shopping list, Scale the recipe up or down, or Return to retrieve Recipe Index menu.

It was here I wondered why the author had chosen not to include the printing option in the menu planning section of the program as well as in the recipe section. It would surely be convenient to have a hard copy of the menus. Of course, you write them down, but a printer would be better.

The folks at Tandy should be made to write the word "category" 500 times on the blackboard. They have it misspelled in the program at this point.

As you recall we asked for inexpensive meals and I noted the choice of Velvet Consomme, which is under the expensive banner. This also took place on several other selections.

There are other interesting functions of this program. You can select a beverage or create a new dish. You can browse through the recipe file of about 320 recipes and get a printed copy if you wish. There is a very handy timer built into the program that you can use and still browse through a recipe. That would be handy while you are cooking. There is a glossary of culinary terms which could be very handy in some gourmet recipes. These are nice additions to the program and enhance its value.

There is a provision for filing your own recipes. They are not included in the main program file and are not privy to some of the options. There is provision for preparing a shopping list for any recipe you retrieve and another option with which you can scale a recipe up or down.

The select beverage portion is nice and offers a good selection of nonalcoholic beverages as well as wines and the like. "Create a new dish" simply takes various kinds of meats and suggests you use a variety of sauces to perk up the meal.

Cookbook does not get a five-star rating, but it surely rates high. In spite of one bad spelling and a missing printing routine, this is almost culinary magic. The recipes are good, too. I've taken a shot at a couple of them and they work. Now perhaps my children will do a review of my cooking!

(Radio Shack stores nationwide, disk $39.95)

— Howard Lee Ball

Screen Inverter Lets You Easily Switch Screen Colors

Oh, programmers of little faith! The first two sentences on the printed sheet which comes with this program are as follows: "This program is sold on an as is basis. We guarantee only that it will load."

That is not a message designed to inspire confidence. However, I found that *Screen Inverter* not only loaded without a hitch, but also worked without any problems at all.

The purpose of *Screen Inverter* is to increase accuracy in "keyboarding" a long and complicated program. Have you ever gotten down to about the 990th line in a program and found that everything just seems to run together on the monitor? Time to take a break for a cup of coffee and rest the eyes! *Screen Inverter* permits you to toggle between a green background with black letters and a black background and green letters. In either case, the letters are crisp and sharp and easy to read.

The program is in machine language and takes up little room in memory (119 bytes). This program comes in two versions, *INVERTLO* and *INVERTHI*. *INVERTLO* will `CLOADM` into the first graphics page; *INVERTHI* will `CLOADM` into the top of your 32K RAM. Of course this means you must use *INVERTLO* if you have only 16K.

Screen Inverter does just what it is supposed to do without problem or fanfare. I believe it would be very helpful when keying in long programs. I can recommend it as a useful addition to your CoCo library.

(Tothian Software, P.O. Box 663, Rimersburg, PA 16248, cassette $9.95)

— Charles L. Redman, Jr.

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The *OS-9 Solution* Helps Simplify OS-9

By John Curl

With the introduction of the *OS-9 Solution*, Spectrum Projects has entered the wonderful world of OS-9. This utility program is in keeping with Spectrum's tradition of offering outstanding software for the CoCo.

The *OS-9 Solution* is a menu-driven utility program designed to make OS-9 an easier to use disk operating system. It is a command file, belonging in your execution directory of your OS-9 disk, which incorporates all of the most useful OS-9 commands (including Copy, Del, Xmode, etc.), and also adds several useful commands that should have been included in OS-9. It is written so both the novice and the experienced OS-9 user will be able to benefit from its power.

The *OS-9 Solution* requires a 64K Color Computer and Level 1 OS-9 Version 01.01.00 or better. You can use any available input or output devices, however, the output devices must support the standard OS-9 cursor positioning control codes. The user must also have a general understanding of OS-9. If you've read the *Getting Started with OS-9* manual and understand it, you should have no problem in using this program. The most important thing to understand is how OS-9 organizes files and directories.

Installing the *OS-9 Solution* is very simple. All you have to do is turn on the computer and boot up OS-9; at the OS9: prompt insert the *OS-9 Solution* diskette, type `/D0/INSTALL` and press ENTER. After this you will be instructed to insert an OS-9 system disk in drive /D0 and supply the filename of your disk format command (this is done in case you have a customized disk formatter), then you are told to insert the diskette on which you wish to install the *OS-9 Solution* and press the letter 'I'. It's that simple!

Operating the *OS-9 Solution* is almost as simple. The program is called *SOLUTION* in the CMDS (commands) directory and shows up the same if you load it into memory. To execute the program just type `SOLUTION` and press ENTER. Optional parameters include directory name (default directory to startup in), -s (single drive option) and #20K (defines the size of the forced buffer you want; in this case it defines a 20K buffer).

The available commands are contained in two menus. You can switch between the two by pressing either the '1' or '2' key. One note: You can still invoke any of the commands regardless of which menu is currently displayed.

(*An asterisk after the command name indicates it is an added command never available on OS-9 before. You can see that the *OS-9 Solution* adds several needed and beneficial commands.)

The commands are:

Alphabetize Directory* — This command is self-explanatory. It puts all of the filenames in the current directory in alphabetical order.

Backup Diskette — Does a backup of a diskette onto another formatted diskette.

Copy File — Copies the current file to a destination. You have the option of specifying the destination path.

Delete Directory or File — Deletes the current filename or directory. If it's a file, the program will ask you to verify if you wish to delete it. If it's a directory file, the program first checks to make sure you have emptied the directory and then, if you have, it deletes it.

Examine File — This command asks you to select the device to which you want to dump the current file. It should display everything you have hooked up to your CoCo that OS-9 can handle. Use the up and down arrows to select the device. It then produces a formatted hexadecimal and ASCII dump of the current file on the device. This is similar to the OS-9 DUMP command.

Format Diskette — Formats a diskette for OS-9. If you are using a customized format command, make sure it is on your system disk when you install the *OS-9 Solution*.

Goto Directory* — This command moves the current directory one level deeper (into the current file to be exact). If the current file is not a directory file you will be told and returned to the same current directory as before.

Help Screens* — Brings up a few screens of run-time instructions that are geared to answer your less complicated questions. It is also a supplement to the main menu commands list.

Information on File* — Displays all available information about a module file. It combines the OS-9 DIR e and IDENT commands.

Jumble Filenames* — This command lets you manually move the filenames of the current directory around. You can place the filenames in any order you like.

Kompare Files — This command compares files. Similar to the CMP command in OS-9.

Load in a File to the Module Directory — Loads the current file into memory and links it into the module directory.

Make a New Directory* — Make a new directory inside the current directory. You input the name of the new directory. It is good practice to use all uppercase names for directories.

New Diskette* — This command *must be used* every time you take the disk out of the drive and replace it with another disk (except during single-drive command operations). If you don't use this command, the disk could be destroyed.

Output File — Outputs the ASCII contents of the current file to an output device. Similar to the OS-9 LIST command.

Put File Together — This command merges two files together. Similar to the OS-9 Merge command.

Quit The OS-9 Solution and Exit to OS-9 — This command simply exits the *OS-9 Solution*.

Rename Current Filename* — Allows you to rename the current filename. This command has its own line editing features.

Set Directories* — Used to set the current and destination directories.

Time and Date Set — Sets the system clock to the correct time and date.

Up One Directory Level* — Takes the current directory, goes up to its parent directory and makes it the current directory.

Verify File* — Opens up the current file and verifies if the modules contained in that file are correct. If the current file is not a module, or it is a directory, an error will be returned.

Work Multiple Files* — This is the biggest and possibly most powerful command in the program. This command has its own set of subcommands (Copy, Delete, Examine, Kompare, Load, Output and Verify) all geared to the handling of multiple files. This saves a great deal of time.

Xmode Parameters* — This powerful command lets you examine and/or change any of the Xmode parameters of any SCF devices.

Y = Display Free Sectors* — Displays the free sectors on the current directory and the destination directory alike. Also displays the names and creation dates of the disks the directories are on.

Z = Execute SHELL Command — Lets you use the SHELL command as a subcommand. You may type in one command line.

Using the *OS-9 Solution* is very easy. The program worked flawlessy the first time I installed it. All of the commands worked as described. Whenever you invoke a command that needs filenames, a very nice directory window is displayed. By using the arrow keys you can scroll up and down the current directory. For rapid movement, the SHIFT and CLEAR keys can be used in addition to the arrow keys.

If you are a single-drive user, remember to include the single-drive parameter when you invoke the program. Also, if at any time you wish to abort an operation, just press the BREAK key. The *OS-9 Solution* will work with any Hi-Res screen utility; just make sure it supports the standard OS-9 screen codes.

The biggest advantage to using this program is its simplicity and speed in invoking commands. OS-9's confusing command syntax was very complicated and time-consuming. That was my major problem with OS-9 in the past. Now that the *OS-9 Solution* is here, I'll probably lose more sleep staying up nights using my CoCo and OS-9.

I could find no shortcomings with this program. As a utility it is superb. I just wonder why the commands were not included in OS-9 to begin with. It would have made adjusting to OS-9 a lot simpler and faster.

Nine pages of instructions come with the program. Aside from a few typing errors, the manual is outstanding. It doesn't teach you OS-9, but it tells you everything you need to know about the program.

The *OS-9 Solution* should answer several experienced users' needs, as well as lure more people into the growing world of pleased OS-9 users.

(Spectrum Projects, Inc., P.O. Box 21272, 93-15 86th Drive, Woodhaven, NY 11421, $39.95 plus $3 S/H)

Dallas Quest Takes You On A Multimillion Dollar Search

Dallas Quest is Datasoft's newest graphics Adventure which is distributed by Radio Shack. It is based on the popular television show *Dallas* and requires 64K and a disk drive.

In this scenario, you have been hired by Sue Ellen and your role as one of the world's greatest detectives is to uncover a missing map revealing the location of a multimillion dollar South American oil field. You must find your way off of Southfork and into the jungles of South America. You will be either helped or hindered by J.R., Lucy, Ray Krebbs or other members of the Ewing clan.

This was my first experience with an Adventure game, so my Adventure-loving husband watched over me as I rambled through the jungle. The level of difficulty can be chosen by the Adventurer. There are many clues, and the more advanced Adventurer will probably want to see how few clues they can take.

One good feature is the ability to save and name seven games in progress. This is good to use when you are not sure what is going to happen next. If you get trampled by elephants or killed by natives, you don't have to start all the way back at Southfork again. Just when you think the end is near, a turn of events reveals there is much more to the Adventure.

The only disappointing part is when I finally did get to the end, I had enjoyed it so much that I wanted it to keep going. Speaking of the end, I don't want to give it away, and my husband agreed, it is a very unique ending.

The graphics are excellent. They are colorful and very detailed. I have watched my husband play other graphics Adventures and the graphics in *Dallas Quest* are the best I have seen.

I really enjoyed playing this game and my family enjoyed watching me struggle. I now understand how people get hooked on Adventure games. If *Dallas Quest* is an example of the types of Adventure games Datasoft produces, I hope to see more programs from them.

(Radio Shack stores nationwide, disk $29.95)

— Jeanne Shell

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Guide to Super Software for the TRS-80 Color Computer Answers Your Questions

By C. L. Pilipauskas

Have you ever wanted to know everything about every piece of applications software ever written for the CoCo? How about a comparison of nine different word processors, six spelling checkers, 16 database managers, seven spreadsheets and 11 other miscellaneous applications programs? That sounds a little more realistic.

Scott L. Norman has just written a book called *Guide to Super Software for the TRS-80 Color Computer*. This 186-page tome relates Mr. Norman's experiences with and his personal opinions about the above described software. He feels that Radio Shack has been selling the CoCo short and wants to let everyone who owns a CoCo or is contemplating the purchase of one, know that this machine should be taken seriously. It is not relegated to just playing shoot-'em-up games or teaching Johnny or Jane the multiplication tables.

The book is divided into seven chapters which will supposedly answer the question "What can the CoCo do today?" Chapter 1 deals in general interest items about the CoCo, such as a short history of the different models, some definitions of computer terms, alternate memory maps, alternate operating system, and "How to Use this Book."

Each subsequent chapter deals with the applications programs themselves. Chapter 2 starts with a brief description of what word processors are and what Scott has used them for. He also describes the problem with the limited display capability of the CoCo and some possible remedies. He goes on to describe the details of each word processor. Most of the chapters start with the least powerful program and work up to the most powerful.

Chapter 3 is more like an adjunct to Chapter 2, since it deals mainly with spelling checkers that verify the spelling of the output of a word processor. The last programs discussed are the so-called mail merge programs. These are the programs that make customized form letters.

The next chapter deals with database managers. These are the programs everyone uses to justify the purchase of the home computer — keeping track of facts and figures. But as Scott said, "If you are a fundamentally disorganized person, the computer is unlikely to help!" After a brief description of what a database manager is and some necessary definitions for the newcomer, we're off to 41 pages of details, examples, shortcomings, etc. Scott also describes, where applicable, programs that run under FLEX and OS-9. These tend to be the most advanced and expensive programs and usually the most powerful.

The fifth chapter deals with the fascinating world of spreadsheet calculators. You know, those things that allow

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one to do "what ifs" in the world of business and management. Again, the author describes the general features of these types of programs and how they're used before going into detail of the various offerings. This chapter includes a lot of specific examples of how these programs handle the information put into them.

The second to the last chapter deals with the areas of business and personal finance. This is the other reason you justified the purchase of your computer — keeping track of the checkbook! Though this chapter includes the kinds of programs you and I would use at home, most of the programs described are for the person with a small- or medium-sized business. Some of these packages are integrated systems — the output of one is used for the input of another and, from the descriptions, sound like they could almost control the holdings of the Howard Hughes estate.

The last chapter the author uses for some speculation on the future of application programs and some possible enhancements for the CoCo to make it even more impressive as a business machine.

The author has no prejudices against cassette-based programs and mentions them only when they could limit the usefulness of a given program. In fact, he mentions that tape is great for archival backups and how a disk drive can use up some of the limited RAM space available for the program's use.

The two appendices list the vendors of the products (hardware) and software mentioned in the text. The book also includes an index, making it easy to find that section you may want to reread.

A book like this can't possibly cover every piece of software that has ever been written for the CoCo, and with the long lead time to publish a book, it is quite possible enhanced versions and completely new packages may be on the market. Scott realized all this and still published the book in hopes of generating interest in the serious use of our favorite computer. Besides, most of the programs described in the book are probably still on the market.

As far as readability is concerned, I would stongly advise you to have a dictionary handy, as the author does have a flair for using $50 words. This makes reading a bit slow when you have to stop and use the dictionary. I found several typos and sentences which made no sense (words omitted, I believe) and one glaring mistake — that the other two operating systems he describes (OS-9 and FLEX) parcel out disk space 256 bits at a time (I believe that's bytes). Though some effort is made to define buzz words used by the different programs, if you're a neophyte concerning application programs, you won't learn a lot since the book wasn't intended to be a tutorial.

In all fairness to this book, even though I have a very limited knowledge in application programs and an even smaller interest, I did learn a good deal about them and can appreciate their ability to help make large jobs a little more manageable. I just wish *Guide to Super Software for the TRS-80 Color Computer* had been a little easier to read.

(Scott L. Norman, Scott, Foresman and Company, Professional Publishing Group, 1900 East Lake Ave., Glenview, IL 60025, $18.95)

Graphics And Text Have Pizazz With *ViziDraw*

By Jeffrey S. Parker

ViziDraw 1.0 is a new program from Arizin, distributed by GRAFX, that lets you create highly intricate Hi-Res drawings and text on your screen, then dump them to a printer.

ViziDraw is a very sophisticated program. With no additional expenses to incur by having to buy a multipack or even a mouse, this program on a stand-alone basis compares very favorably with other higher priced software packages for the CoCo. It even has some features that *MacPaint* doesn't have!

What makes *ViziDraw* special is that it is almost entirely joystick or mouse oriented. Upon start-up, the user is presented with a blank worksheet surrounded on four sides by icons, which are accessed by means of a joystick or mouse. Arizin recommends, and I found it true, that a mouse is easier and faster to use than a joystick. I found that using a mouse for large movements in the right joystick port, and a non-centering joystick in the left joystick port, allowed the easiest mobility around the screen and the most refined control for those intricate little touches.

ViziDraw comes with the system diskette and a diskette of optional character type fonts not included on the system diskette. When the program is first started and run, some "custom tailoring" is required by the user: You must configure the program to the printer you have. I found that a dump to a Radio Shack DMP-105 was extremely quick and efficient when run at 9600 Baud from the parallel port. Just enable or deactivate a high speed poke and poke a printer Baud rate. These steps are easy, well-defined in the manual, and only require a one-time expenditure of five minutes or so to complete. Once the modifications are made, the user saves the tailored version back to disk (or tape) and off you go.

ViziDraw is almost all menu and icon oriented. It is possible to access nearly every feature of the program with only a mouse or joystick. The few exceptions are resetting coordinates on the worksheet, accessing type font styles (such as bold and double-size characters) and, of course, text entry. Other than that, whether one wants to paint, fill, magnify, rotate, create a tilted mirror image, or another graphics display, you just click and go!

ViziDraw comes with a 35-page manual which outlines in well-ordered sections all the features of the program and how to use them. The reading is a bit rigorous and tends to bog down in places where a simple example would have sufficed. Nevertheless, inside of an hour or so, even the users out there who have always been afraid to draw (myself included) can be clicking away with amazing results in less than an hour!

ViziDraw has the capability to mix graphics text characters and graphics characters in any combination on the screen. The screen is divided into six sections, two sections across and three sections down. One can use only a corner of the drawing worksheet or all of it, and display the progress of the whole design at any time. This may seem confusing at first, but if you think of the worksheet as a window onto a larger space, after a short time moving about by arrow icons seems quite natural.

I was surprised by the power and versatility of *ViziDraw*. Each time I thought I had stumped the program, I would find my answers somewhere in the documentation. For instance, I discovered that a disk directory for any drive can be done without leaving the program, and that options such as bit spacing and bit thickness are easily selectable. I found that several types of formats for locating, loading and saving files are recognized by the system.

Perhaps most importantly, I found a real excellence in error handling with *ViziDraw*. Some programs can crash suddenly; not so with *ViziDraw*. It has a built-in command loop which automatically reroutes the program back to the worksheet buffer on error detect. This is true even if you accidentally break out of the program or reset the computer. As long as the computer is left running, no matter what happens you can get back to your work in progress. What a relief!

Powerful routines have been worked into *ViziDraw*, like the GET and PUT commands that allow you to cut a window out of a picture and put it somewhere else, either on the drawing or entirely removed from the current drawing by means of putting it in a "Library" buffer. The Library buffer will take a current worksheet and dump it into high RAM where it is saved online. Video pages can be swapped into and out of the Library to make use of several different sections of several different graphics designs.

The UNDO command is also powerful. When you have just painted in an entire screen by accident, one touch of the UNDO command erases all. Changed your mind? Undo the UNDO!

ViziDraw is crammed with more powerful features than there is room to list here. The program is written in BASIC and is therefore "user transparent"; it can be changed to suit you.

It comes with drivers to support a wide band of popular printers. Dumping to a printer requires the click of a button, the punch of a key for verification and, in a very short time, there's the image on paper. The bit scale is movable so you can have the scale on screen equal, greater or less than the bit scale of the printer (i.e., one pixel equals one printer dot, five printer dots, one mile, three liters, etc.).

In conclusion, *ViziDraw* is an extremely powerful graphics utility for the Color Computer, with highly sophisticated features and abilities. It is easy to use and runs quickly and smoothly. *ViziDraw* will dump to a printer reliably and efficiently, and allow the user to stop print at any time. *ViziDraw*, with its sophisticated routines for rotation, mirroring, alteration, text and many different type fonts may not be the "max," but at $49.95 for disk or tape, it sure comes close!

(Arizin, distributed by GRAFX, P.O. Box 254, West Mifflin, PA 15122, tape or disk $49.95, requires 64K and joystick or mouse [mouse and joystick combination suggested].)

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Fast-Food Fun With *Franchise!*

The bank finally approved your loan, and you purchased your first fast-food restaurant. "Frank's" fast-food chain, once a dream of yours, is now on its way to becoming a reality. Your dream is to open 15 restaurants and then retire to a plush mansion overlooking the ocean. Only you can determine how successful the chain will become. Careful weekly planning and "fast and friendly service" (along with a lot of beef in your burgers) will help you realize this dream.

Have you ever wondered what it would be like to own your own fast-food chain? Well, now Computerware gives you the chance to experience being an entrepreneur with its new Simulation game called *Franchise!*

Franchise! is a fun game to play. It is completely joystick controlled, so you don't even have to touch the keyboard. All you do is point arrows at your choice and push the button. To me this is a plus because I don't have to remember a whole new set of commands just to play a game.

Franchise! requires 64K to operate. Very few software producers offer games that can be used only in 64K machines. It was well worth the effort and risk to put out a 64K-only game because the game could not possibly be the same in a 16K or 32K version.

You run your restaurants on a weekly basis. Every week you order food, buy advertising, pay your employees, sell franchises and open new, self-owned restaurants. For those of you who think that is too much to do, you don't have to reset these every month, you can just keep last week's values.

It takes $100,000 to open a new, self-owned restaurant, so you have to wait awhile before you have an entire chain. Or you could sell franchises and collect $20,000 plus a percentage of their profits in fees every month. To win, you have to establish seven self-owned restaurants and eight franchises or vice versa, but you only have three years to do it in, so you can't waste any time!

During your activities for the week, you can also check competitor's chains to see how well they are doing. This can help you decide what to do, and it will also tell you how the general economy is doing. A random effect in the economy is present in every game to make each game a challenge. You can also close down self-owned restaurants if they are not doing well.

Some of you are thinking you won't like this game because there is no real action to it, but about once every four weeks you visit one of your restaurants and have to run around filling orders. Each person will only wait so long before becoming upset, and if you get too many people walking out of the restaurant your sales will begin to decline. The food they order is not always ready and the only thing you can do is to tear your hair out while waiting for a drink to come out.

All in all, *Franchise!* is a very good game. Not only is it fun to play, but it relieves the boredom of always playing arcade games, doing word processing, business or whatever. I strongly recommend *Franchise!* for anyone looking for some enjoyment. I certainly enjoyed playing it for this review.

(Computerware, 4403 Manchester Ave., Suite 102, Box 668, Encinitas, CA 92024, requires 64K, tape $24.95, disk $27.95)

— Andy Dater

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This one-liner draws a face on the screen.

The listing:

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LE(126,96),60,4:LINE(89,191)-(10
7,146),PSET:LINE(159,191)-(141,1
46),PSET:CIRCLE(106,86),9,3:LINE
(106,116)-(146,116),PSET:CIRCLE(
146,86),9,3:PAINT(126,186),3,4:F
OR X=1 TO 10000:NEXT X
```
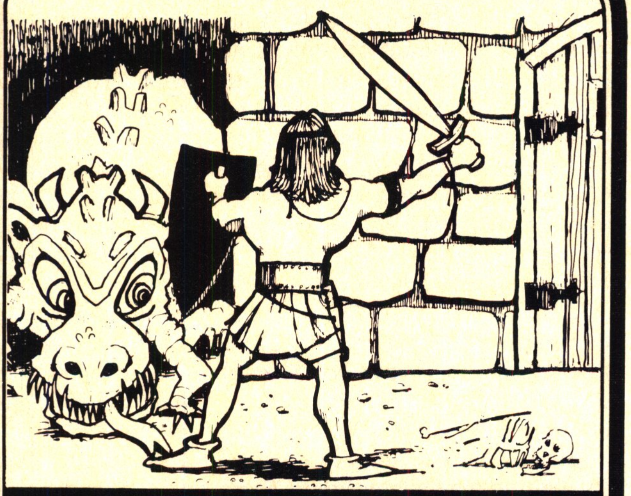

Steve Jones
Cherryville, NC

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape.*)

Denna



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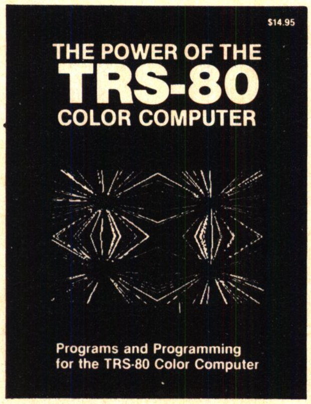
DENNA is a graphic adventure game requiring 32K and Extended Basic. Player picks his character along with strength, agility, physique and alertness. He must maneuver through a multi-tiered dungeon whose play and characteristics are different every game. Player collects items, inventory, checks status and any of 7 other options. Combat with all sorts of monsters. Lots of fun. *Cassette $25.95 and disk $28.95. Versions are different.*



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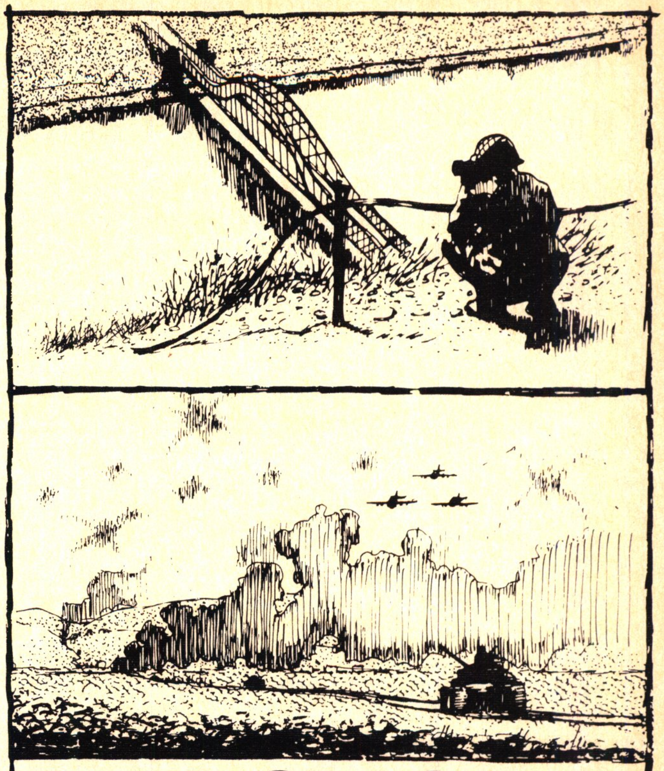

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Software Review

Solar Explorer Takes You On A Factual Trip To The Planets

Did you know that the planet Pluto has one moon? Well, when I was younger, I thought I was pretty smart about astronomy, but Pluto's moon was one fact I missed. *Solar Explorer* is a new program from Radio Shack that can be used as an introductory course in astronomy. With this program, a person becomes an explorer traveling through the solar system and collecting facts about the planets and Earth's moon.

Solar Explorer is designed for use with a 32K cassette or a disk system with ECB. The package comes with one cassette and one disk. The manual tells you to back up the disk first thing. A TRS-80 Electronic Book is also required. The Electronic Book plugs into the right joystick port. The software comes with pages that go into the Electronic Book and the user presses points on the pages for his selections and responses.

The first page used is the "Solar System" activity page. Some general facts about the planets and the moon can be obtained using this page. To get more information, you must make an exploratory trip to the planet or the moon. You can do this using the "Launch Control" and "Probe Control" activity pages. You must pick a destination and launch your spaceship to the desired planet or moon. Once there, you must establish an orbit and send down a robot probe.

The probe can collect a lot of data if you do not take too much time. This information includes density, temperatures, number of moons, diameter, gravity, mass and atmosphere. You can even compare the distance a rock could be thrown on the planet as compared to a rock thrown with the same force on Earth. You can get the information if done quickly. You can only stay in orbit for a certain amount of time. You must have enough fuel to return to Earth or you will run out of gas on the way back and float forever in space. You will get a "Low Fuel" warning when it is getting close to time to return to Earth.

The last activity of the program is a review of the information obtained on your space flights. The "Master Data" activity checks your knowledge of the planets or the moon. It awards Solar Credits according to the information you remember.

When I first got the program I thought it would be good for junior high school, but my 12-year-old enjoyed the space flights and he learned some things about astronomy without realizing it. To my greater surprise, my 8-year-old enjoyed the program, too. While my first impression was the program would be good in a school environment, I believe it really belongs in the home (just don't tell your children that it is an educational program). Radio Shack has brought out some outstanding educational programs and this has to be counted as another one.

My only complaint about the program is it requires the Electronic Book which cost another $19.95. There is more software out that uses the E.B. and if even more programs come out, it may not be such a bad investment to get one. I believe it is utilized very well in conjunction with this software. I can recommend *Solar Explorer*, but you have to have the Electronic Book to use it.

(Radio Shack stores nationwide, disk and cassette, $19.95, requires 32K ECB and Electronic Book, $19.95)

— Dale Shell

Connect your TRS-80 Color Computer to the Outside World

Learn the simple techniques for putting your computer to work monitoring and controlling outside devices and instruments. Construct and use input and output ports, analog-to-digital and digital-to-analog converters to control signals using BASIC language programs. Excellent for individual or classroom instruction.

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Submitting Material To Rainbow

Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs which will be useful/helpful/fun for other CoCo owners.

Program submissions must be on tape or disk and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs. All programs should be supported by some editorial commentary explaining how the program works. Generally, we're much more interested in how your submission works and runs than how you developed it. Programs should be learning experiences.

We do pay for submissions, based on a number of criteria. Those wishing remuneration should *so state* when making submissions.

For the benefit of those who wish more detailed information on making submissions, please send a SASE to: Submissions Editor, THE RAINBOW, The Falsoft Building, Prospect, KY 40059. We will send you some more comprehensive guidelines.

Please do not submit programs or articles currently submitted to another publication.

Full Character Set Board Gives Precision Lowercase Letters

One of the criticisms of the CoCo since the beginning has been its lack of lowercase letters on the screen. Instead, it shows us letters in inverse video. This can be a problem when one is using a modem or OS-9, and the inverse letters are just not pleasing to the eye. Enter the Full Character Set Board from CoCo Devices to add lowercase and make our screen more aesthetically pleasing.

This add-in PC board gives a new character set to your CoCo so you can have ASCII characters 97-122 as actual lowercase letters with true descenders. As a matter of fact, this board gives a true representation of all 96 characters of the ASCII set. In addition, you get a slashed numeral zero (0) to help tell it from a 'D' or an 'O.' The board also has a place where a switch can be installed to switch between the new character set and the CoCo standard set. Another switch option that can be added lets you switch between inverse and normal video.

The instructions say you can also switch to an inverse set of uppercase letters with software, but then doesn't explain how to do this. I found that you can use POKEs to screen memory, starting with ASCII 34 as inverse 'A' to get uppercase inverse letters.

The installation itself was fairly routine. First, you remove your CoCo's case. (Wait until after the 90-day warranty has expired to start working on your CoCo.) After opening the CoCo's case, locate the MC6847 chip and remove it. The instructions say to "Note the location of pin 1," then put the MC6847 in open socket on the PC board. The instructions again say "Note the position of pin 1." (I didn't know which was pin 1 on an IC. I looked it up and found that pin 1 is the one next to the small round indentation on the top of the chip.) The MC6847 gets installed in the PC board such that pin 1 faces the same direction in the PC board as it did in the CoCo. Since the board will only fit in your CoCo one way, this is a fairly safe way to install the MC6847 into the PC board.

Perhaps CoCo Devices could revise their instructions to make it easy for someone without knowledge of ICs to install the board. Some pictures or diagrams would be nice.

After this, plug the PC board into the socket left vacant when you took out the MC6847, then just put your CoCo's case back on and turn it on. If you had installed the switches for inverse video or for normal CoCo character sets, you would need to install them on the outside of your CoCo's case before you closed it up.

Once you turn CoCo back on, you have a new character set all ready to go. The characters themselves are beautiful. They are even better looking than some of the other lowercase kits on the market. The slashed zero is also a sight to behold. The lowercase descenders are full and well-shaped.

The real wonder of this product comes when you boot up another DOS besides Disk BASIC. No more inverse this or that under OS-9 to represent characters the CoCo doesn't have. Instead, you have all the special characters so important to OS-9 and C programming on the screen as they actually are.

Seeing and being able to type filenames and commands in lowercase is a treat. The same is true under ADOS, another alternative to Disk BASIC. ADOS will recognize commands in lowercase and uses lowercase in its error messages. Being able to feel at home with the lowercase made ADOS much more useful to me.

Communications over the modem is also enhanced by this product. Many BBSs use lowercase extensively. I was surprised by how much easier my online time went just by not having to see those inverse letters.

Dr. Megabyte prescribes this product very highly to anyone who uses OS-9, programs in C or both. The Doc asks CoCo Devices to rewrite their installation instructions to make them a little clearer. This small problem aside, the Full Character Set Board is a good product at a reasonable price. If you have never had a complaint about your inverse letters, then you may never need this product. However, if you want lowercase letters as well as true representation of special characters for your CoCo, then you should highly consider this product as an addition to your CoCo.

(CoCo Devices, P.O. Box 677, Seabrook, TX 77586, $38 plus $2 S/H)

— Mark E. Sunderlin

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Fast Food Math: A Catchy Idea With Real Educational Value

Do you like hamburgers, cheeseburgers, french fries and milk shakes? Do you like to eat at McDonald's? Do you like computer programs that make use of real life situations with real life problems? Being a junk food lover myself and the father of a "McDonald-holic," I feel qualified to evaluate this program (hoping I will not gain weight as I do so).

Fast Food Math is another program from the Middletown Educational Software Association. This organization is a group of high school students and their teachers who are not only programming but marketing their programs. *Fast Food Math* is one of eight programs they currently market. This program requires 32K Extended Color BASIC. You can purchase the program on tape or disk, but it will only work with one disk drive. If you have two drives though, don't worry, just don't turn on the second drive.

Fast Food Math is a program designed to aid students in grades two through eight in learning to handle money, both coins and bills. You can use the program with one student at a time, but it really shines when you have a group of students working together pricing hamburgers and milk shakes, keeping track of inventory and handling play money in their transactions.

The manual is very thorough in explaining how to start up and run the program, and in giving prerequisite skills needed to use all the features of the program. Students need to know where the ENTER key is and where the numbers are on the keyboard. They also need to know that when they type in money amounts they should not include the dollar sign ($). After making a backup copy of the program (you are licensed to make two backup copies when you buy the program), you either `RUN "MATH"` or `CLOAD "MATH"` and then `RUN` it.

Following the copyright screen and title screen, students have the choice to change any of the original material. This includes the prices on the food and the tax rate. The manual gives a very good description of how to do this but, because of the on-screen instructions, it is also very easy to do if you do not read the manual. Students are then asked if they would like to keep a cash drawer. Here they can use play money to simulate a "real" McDonald's.

After this, they are asked if they would like to keep an inventory. If they know what an inventory is and want to keep it, the number of each food item in stock can be created, after which the computer will keep track of how much of each item is sold. If more of an item is sold than is in stock, a negative inventory count will occur. After the inventory choice, students choose on what level they want to work.

There are four levels in this program: 1) Part Timer, 2) Counter Person, 3) Cashier and 4) Manager. In level one, food items, food prices and total cost are displayed. Students then enter the amount that is received from the customer (this cannot be greater than $20). If the amount is not enough, a new figure is requested. When the amount is enough, the computer will display the correct amount of change due, then there is another screen where the change is calculated. The monetary values from $10 through $.01 are displayed on the left side of the screen and they enter the number of pieces of each type of currency that is needed when the cursor is to the right of that value. If they want to skip a value, just press ENTER. If the amount of change is incorrect, a buzz will sound and they will get another chance; if the amount is correct they will go to the ending screen where there is a choice given to continue or end.

Level two is like level one except students have to subtract the purchase from the amount received to get the amount of change needed. In Level three the order is displayed and they have to add up the total cost of the items purchased in addition to doing the subtracting to find the change. The final level incorporates the increasing difficulty of the preceding levels and, in addition, students have to calculate and add the correct sales tax to the purchase.

Included in the manual are some suggested activities that you could try and some technical notes on running the program. There is also an evaluation form to be sent back to MESA and an order form for their other programs.

As a sixth grade teacher who has a second job working in a retail store, I think this program has tremendous potential. It is nice to have a program that does not monopolize one computer for one student, but is designed to include groups of students or even a whole class. I like this program because students can learn about pricing, making change, sales tax and inventory on a computer — computers are being used to do that very thing, as well as many other things, in the "real world."

Finally, I think the use of a fast-food restaurant like McDonald's is a catchy idea that will hold the attention of students. My 9-year-old enjoyed this program and my 2-year-old just loved it; even though she cannot do math, she thinks McDonald's is the best place on earth.

(MESA, Middletown High School, Valley Road, Middletown, RI 02840, tape $24, disk $26)

— Thomas E. Nedreberg

Hint . . .

Telewriter-64 ASCII File Problems

When you try to load ASCII files generated by some other programs into *Telewriter-64* (*VIP Terminal* is one example), the program will often display an OK prompt instead of returning to the editor. This is because *Telewriter-64* doesn't recognize the end of file marker. When this happens, key in the following lines:

```
460 END ENTER
EN=214 ENTER
GOTO 458 ENTER
RUN ENTER
```

You will then have the ASCII disk I/O menu; press 'E' to return to the editor.

Abbey Strauss
New York, NY

Account For Yourself With *Ledger One*

By Dan Smith

Being an accountant for the past 10 years and currently the controller of a national nonprofit organization, I have seen numerous computerized accounting systems in operation. It was a pleasant surprise to receive the opportunity to review this software genre for the Color Computer.

Ledger One is a single-entry bookkeeping program that requires a 32K or 64K CoCo with Extended BASIC, one disk drive and a printer. The program is available on either tape or disk, however, data is savable only to disk. Since both versions cost the same, I believe it is more beneficial to order the disk version.

The instruction manual is four pages of 8½ by 11-inch paper printed in condensed type. The instructions are very clear even though there are typographical and informational errors. Apparently, part of the blame for the informational errors is the lack of revisions due to the upgraded versions of the program. However, the program is so easy to operate, the instructions can, for the most part, be ignored.

The initial step in operating the program (per the instruction manual) is to `RUN "L1LOADER"` which does both a disk `PCLEAR 0` and runs the main program of *Ledger One*. The `PCLEAR 0` is necessary because all of the transactions reside in memory until you decide to save them to disk.

I had to run this preloader twice to enter the main program. On the first run, I kept getting an "SN Error in 4." Upon `LIST`ing this line, I could not detect any errors.

Once into the main program of *Ledger One*, I immediately received another SN Error; this time in Line 510. In `LIST`ing this line, I found the second parenthesis for a `PEEK` missing. After inserting this character, the program ran with no problem at all.

Ledger One initially lists all the files on the disk directory. To create a new file or load an existing one, just type in its name.

If it is a new file, you must establish the chart of accounts. Up to 50 accounts may be utilized. Since you cannot change the number of accounts once a file is created, you should consider having more accounts available than you need to facilitate potential expansion in the future. You are then asked the number of income accounts you desire; the difference is automatically calculated to be the number of expense accounts. You then assign each account number with a two-character code and an account title. I found that, contrary to the instructions, a three-character code could be input.

The main menu then comes into view. The bottom section lists the number of income and expense accounts, the total number of transactions available (over 200), the number of transactions used, the available string space and the remaining memory. The top section has 11 options which are relatively self-explanatory.

Add Data records the actual transactions by date (YYMMDD), Paid To or Received From, the account

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distribution and the dollar amount. If the date or Paid To/Received From data is identical for the next transaction, you can just type 'S' to duplicate that data.

Edit Data enables editing any portion of a transaction on a given date.

View Data permits examining the transactions of a specific account or the entire file on the video screen.

Print File is similar to the View Data function except it produces a hard copy and a screen display. The hard copy has a default of 45 transactions per page, but you can vary the actual number.

Data Save saves the data in memory to disk. The program also permits you to make a backup. You should seriously consider saving data often to prevent the loss of the data in memory.

Report (Fin) prints an income and expense statement.

Sort by Date sorts all of the transactions by date. Since a file can be expansive, it is recommended to perform sorts frequently to save time in the long run.

Change Accounts permits changing the report's title, the number of income accounts (and automatically refigures the number of expense accounts) and the account titles.

Find/Search is a global search by a key word. For instance, I input "Smith" and eight entries were listed on the screen. These entries not only included transactions with Smith in them, but those with "Goldsmith" and "locksmith" as well.

Test for Errors is used primarily for detecting errors if you have changed the account codes, account titles or the number of each.

'H' represents Help, which is a brief synopsis of the functions of the program. The manual mentions that this function can be deleted in order to increase transaction capacity by approximately 70 entries. However, it was already deleted from the disk version preventing me from testing its intended function as well as verifying the increased capacity.

All menu items are listed numerically (except Help) and you type in the appropriate number to access that particular function. Not mentioned in the manual is the fact that you can also input the first letter of the function to also access it. For example, 'A' accesses Add Data or 'S' accesses Sort by Date.

To thoroughly test *Ledger One*, I keyed in all of my personal transactions for the previous two months and tested every option. The program's financial operations performed flawlessly. I compared transactions and summaries with another accounting program I use and found no discrepancies whatsoever.

The problem areas I did experience were minor. For instance, on the Income and Expense Statement, every income amount had a dollar sign in front of it, but there were none for the net income amount. Also, the underscores for the totals were off by one print position.

Another minor point is that there is no error trapping for erroneous dates. I used 999999 as the date for a transaction and it was dutifully accepted.

Even though there are a few rough edges that need to be smoothed out by the author, this is a good bookkeeping program for non-accountants. *Ledger One* is not a full-blown accounting package, but everything the program intends to do, it does very well. It should be a welcomed addition for clubs and personal use since it does much more than those typical "balance your checkbook" programs, and just imagine your CPA's face the next time you turn in your financial information on an attractive computer printout instead of in the traditional shoe box!

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One-Liner Contest Winner . . .

This one-liner, which requires a printer, figures straight-time wages and tax deductions. Simply make the printer ready and enter the pay rate, hours worked and the tax rate. (The tax rate should be the sum of all federal, state and local deductions.)

The listing:

```
0 INPUT"PAYRATE";A:INPUT"HOURS";
B:C=A*B:PRINTC:INPUT"TAX";D:D=C*
D:PRINTD:PRINT"PAYRATE=";A:PRINT
"HOURS=";B:PRINT"GROSS=";C:PRINT
"TAX=";D:PRINT"NET=";C-D:PRINT#-
2,"PAYRATE="A:PRINT#-2,"HOURS="B
:PRINT#-2,"GROSS="C:PRINT#-2,"TA
X="D:PRINT#-2,"NET="C-D
```

Charles Hager
Colorado Springs, CO

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape.*)

256K Becomes A Reality With *Thunder RAM*

By Dan Downard

"How much RAM do you have in your CoCo?" How many times have you answered that question? What expression would you expect if you answered, "256K!"

It's a reality with *Thunder RAM* from Spectrum projects and Cris Erving. What makes it different from the 128K upgrade kits? You not only get the RAM chips, but a complete hardware and software package that works. All for a reasonable price, too! The only pitfall is that presently *Thunder RAM* is only available for 'D', 'E' and 'F' boards due to hardware restrictions. It is possible to use *Thunder RAM* in an all-tape system, but the software is designed for use with a CoCo with at least one disk drive.

The Hardware

Thunder RAM consists of eight 256K RAM chips and a controller board. Adequate instructions are given regarding installation, but it is our understanding the installation section of the manual has been completely rewritten since our preliminary version was received. The new manual includes a check list instead of a broad description of the hardware installation — a definite improvement.

I have an 'E' board CoCo; it took about 10 minutes to install the *Thunder RAM*. A few capacitors and a jumper had to be removed. The 6809E is removed from its socket and the *Thunder RAM* controller board is plugged into the empty socket. The 6809E then plugs into the controller board. The SAM chip has to be removed in order to bend Pin 11 out for one of two clip-on connections to the controller board, then the existing RAM chips are removed and the 256K chips are inserted.

Sound easy? Well, you be the judge. With step-by-step instructions, I wouldn't be afraid to recommend it to an average computer enthusiast. After all, there is no soldering required. To equate this to other hardware projects, it's about the same as doing a 64K upgrade.

The Software

I have seen many other upgrade kits; we even printed one in THE RAINBOW, but, to be quite honest about it, memory is not worth a dime if you don't have adequate software. After all, Disk BASIC can still access only 32K.

What Cris Erving, the developer, has done is put a 2K EPROM on the controller board with built-in software called TDOS. TDOS is enabled by a single line BASIC command: `POKE&HFFFF,4:EXEC&HF000`. After this direct command line, you are greeted with the TDOS menu. TDOS has all the software required in a ROM to use the *Thunder RAM* as a RAM disk and a print spooler. (For those of you who are not familiar with a RAM disk, it is a disk drive that uses RAM chips instead of a floppy. Super fast, to say the least.)

When TDOS is initialized, it defaults to a 160K CoCo disk, a 20K print spooler and, of course, still has 64K available for your "working bank" of RAM.

As previously mentioned, a 20K print spooler is enabled from the TDOS menu. A print spooler is a program that allows a large amount of memory to act as a buffer between your computer and your printer. By using a spooler, you can send data to the printer as a background task, while running another program. A good example would be composing another letter on your word processor while printing the one you just finished.

There is a restriction on the use of the spooler: the Baud rate of your printer must be set on, or above, 1200 Baud. Speeds slower than 1200 Baud make the use of a spooler impractical due to the amount of overhead used to send the individual characters.

The RAM Disk is the real heart of the package. I have two disk drives. Upon power-up of the computer I activate the TDOS ROM, and after initialization of the *Thunder RAM* as Drive 2, I just use the command `BACKUP0TO2` and everything in Drive 0 is copied to the RAM Disk. With all of my favorite programs on the RAM Disk, I have instant recall of programs. A 32K ML game will load in less than a second.

Even though I didn't try it, I think the real advantage of a RAM Disk is in recall of data, either for databases or for graphics screens. This is where speed is important.

The TDOS ROM actually patches BASIC's DSKCON routine to allow complete compatibility with existing Disk BASIC programs. As far as my CoCo knows, there is a third disk drive online.

All of the TDOS routines are available from BASIC or machine language, with the assumption that the only

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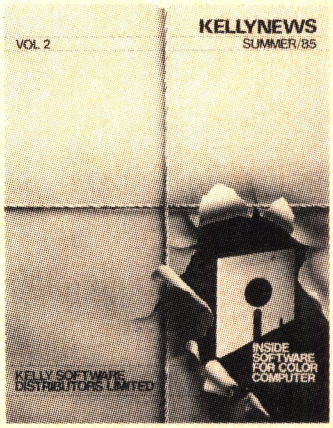
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restraint is the user's ingenuity. An additional 50-page manual is available on a diskette supplied with the package. This manual contains all of the technical information pertaining to programming with TDOS along with complete source codes for the TDOS routines.

I was particularly interested in the assembly language programming techniques available. The following calls can be made to the extended address space by the use of TDOS vectors:

```
JMP   ,Y
JMP   [,Y]
JMP   A,Y
JMP   [A,Y]
```

These commands literally allow a 256K machine language program to be written.

An example of this technique is:

```
LBD  #3  Use bank 3
LDY  #$403C  Jump address
JMP  [$F030]  TDOS vector address
```

Ample information is also given on passing variables and graphics information from bank to bank in BASIC.

Other routines are available for loading and saving one, two or four bytes from, or to, one of the three memory banks.

As I have previously stated, I think the *Thunder RAM* package is great, but there is one drawback. The RAM banks are switched in 64K modules. The TDOS ROM has a control register that is accessed by writing to address $FFFF. The register looks like this:

D0	CPU Bank LSB
D1	CPU Bank MSB
D2	TDOS ROM Flag
D3	Video Bank LSB
D4	Video Bank MSB
D5	Not used
D6	32K Page
D7	32K Mode Flag (1=32K)

Bits D6 and D7 are for software control only. Otherwise, you actually switch the RAM banks by setting bits D0 and D1. This makes the use of 32K bank switching difficult, to say the least. Why worry? Well, I see a great need for more memory in OS-9 systems, and as far as I can tell, 32K banks are necessary for RAM Disk operation with OS-9.

Several common programs using their own DOS will not work with the *Thunder RAM*, the main example being *Telewriter-64*. It will still work, but you can't take advantage of the RAM disk.

I think *Thunder RAM* is one of the most innovative products for the CoCo to come along lately. Bob Rosen of Spectrum Projects has obtained the agreement of several major software authors to support the system, so the minor problems mentioned above will disappear shortly. I don't know what I did before without *Thunder RAM*. Cris Erving is to be congratulated on a job well-done.

(Spectrum Projects, P.O. Box 21272, 93-15 86th Drive, Woodhaven, NY 11421, 64K Disk, $119.95 plus $3 S/H)

Magic Lessons Shows You The Trick Behind Those Tricks

I'm sure I wouldn't have looked at this package twice if RAINBOW hadn't asked me to review it, but I'm glad they did! I wouldn't have looked because I have a personal aversion to "magical" things. Also, because everyone knows doing magic tricks requires lots of reading to learn how they're done, special equipment and some smooth talk. That seems like a real commitment in time and money.

But *Magic Lessons* gives you illustrated, step-by-step instructions, the special equipment you need and even a script of suggested patter to get you going. Each disk gives you three different tricks.

The documentation is all on disk. The printed cover sheet just explains start-up. It tells you to `RUN "MAGIC"`. (My CoCo gave me an error message: SN Error at 50, but just type `RUN` and ENTER and the Merlin Software full-screen logo comes up.)

Merlin Software gets an A+ for customer service. A letter to them generated a prompt long distance phone reply from the owner/programmer, magician Jeff White. The syntax error is apparently caused by that old `PCLEAR` glitch in the CoCo ROM. The `PCLEAR` is being moved so no one should have a problem with that.

The logo is followed by a menu where you choose which of the three tricks you want explained. You are taken through each step with easy-to-follow instructions and pictures. The instructions and diagrams are clear and easy to read, even on my TV screen.

After completing all three tricks (no cheating now), the cover sheet says to press number four of the main menu if you have a printer. This prints out a nifty certificate of graduation and a discount coupon for future purchases. Pressing number five will give you a larger version of the graduation certificate for your wall.

Disk number one has lessons one through three which are card tricks. Three envelopes contain the cards you need for each trick. Lessons four through six are coin tricks. Again, everything needed for each trick is neatly packed for you. These are available only on disk right now, but the author tells me tape versions are being worked on.

I'm not selling tickets for my act yet, but I did go from ho-hum to being enthusiastically interested. You might want to give *Magic Lessons* a try, too.

(Merlin's Software, 11515 Casey Road, Tampa, FL 33624, *Magic Lessons* 1-3, disk $19.95, *Magic Lessons* 4-6, disk $19.95, requires 32K ECB, printer optional.)

— Bob Dooman

Graphic Physics — An Illustrated Explanation Of Physics Concepts

Graphic Physics is a 16K Extended Color BASIC program allowing the exploration of some concepts in physics. When the program is run you are greeted with a menu with eight options for doppler effects, orbits, superposition of two waves, two-dimensional and three-dimensional Lissajous figures, pitch sounds, relativity and quitting. (If you don't know what a Lissajous figure is, don't worry, all the instructions are in the program and they also explain about Lissajous figures.)

When one of the options one through seven is picked, you are prompted whether or not you wish to receive instructions. In most instances the instructions explain what is going to happen and what is being illustrated. Most of the time the explanations are fairly clear, but I believe the program would be best utilized in a classroom. It provides some good graphics examples and a physics instructor could incorporate this program very well into his lecture.

I can give a brief description of the different options on the menu. The doppler option illustrates how sound waves bunch up in front of an object flying through the air. The orbit option allows you to enter different speeds, altitudes and gravitational accelerations to determine if an object would orbit a planet. Superposition shows what happens when two waves interact. This provides good examples when the waves are similar in amplitude and frequency. The pitch option gives a tone and you have to tell what frequency it is (it is a multiple-choice question). The relativity option gives examples of how length, mass and time are distorted as something approaches the speed of light. The Lissajous figures are displayed on the screen after you input the initial conditions. I think some of these concepts would have been easier to grasp if I could have had these examples when the concepts were first introduced to me.

Graphic Physics came on cassette with a page of sample input values for examples. The program was easily saved to disk and ran fine from disk. Very little documentation came with the cassette, but most of the information is included in the program; just `CLOAD` the program and experiment!

(Tothian Software, P.O. Box 663, Rimersburg, PA 16248, cassette $19.95)

— Dale Shell

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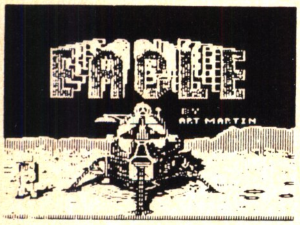

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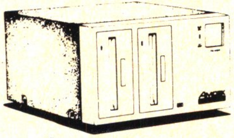

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Getting Your 'Back To Basics' With The Spine Align Cushion

Nothing can affect personal productivity worse than an aching back, especially if you spend hours in front of a computer terminal.

There are various remedies available to help alleviate some of the discomfort, as evidenced by the number and variety of products that line the medicine cabinet shelves of back sufferers.

Maybe you've resorted to one of those Oriental back massagers — the wooden balls you pull across your back. You've probably used an electric vibrator, maybe even one of those special Balans chairs that have become so popular with computer users. Most of us will try just about anything to ease the pain.

That's why I welcomed the opportunity to review the new Spine Align Cushion which the manufacturer says is "designed to relieve back pain and prevent future back pain." The cushion is gray, approximately 12-by-12 inches square, two inches thick and is specially contoured to tilt the pelvis forward far enough to straighten your lower back, but not far enough to be uncomfortable.

Now I am one of those persons who either slopes forward or sits back too far while computing, which causes a great many of my problems, no doubt. The Spine Align Cushion, however, forces you into the correct sitting posture. Try any of your old tricks and you will be extremely uncomfortable.

The cushion is not unattractive; if you have a lot of cushions in your family room, it will probably fit right in.

It comes with an attractive brochure that describes in detail how to position the cushion in your chair, along with directions on adjusting the chair for the best fit. Also included are a lot of facts and figures on how back pain affects the work force.

The cushion is quite comfortable, but I never noticed any "overnight" cures after using it for several days. As you know, back pains tend to come and go. I did feel better about my posture, though. And if the Spine Align Cushion helps me to be more aware of the importance of good posture, the investment may well be worth it. Over several months you probably would be able to feel the difference.

(Spine Align, 345 S. McDowell Blvd., Suite 209, Petaluma, CA 94952, $39.95 plus $2.50 S/H)

— Charles Springer

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Doomsday at 2100 Offers New Challenge For The Adventurer

Adventure games are usually best played on rainy and/or winter days because they are such time burners. Hours fly by as you pit your mental skills against the game (or actually the author of the game), gaining points, finding treasures and occasionally, when the forces of evil gain the upper hand, dying in the process. Fortunately, you are given the opportunity to instantly reincarnate and try again, hopefully gaining from your mistakes.

My first exposure to an Adventure game was a kid's Adventure found in *Chromasette* electronic magazine called *Old House*. Since it was written in BASIC to be used on 16K CoCos, it was a relatively simple kids' Adventure game. You went from room to room looking for things: keys, boxes, closets, etc., which would allow you to get to the treasure and escape the house alive. Although I'm not a kid, it was fun and I was hooked.

Evidently a lot of you are also hooked, as there is sufficient demand to create an expanded offering of not only more difficult Adventures, but Adventures with more features to make the game more enjoyable.

Disk graphics Adventures were released to graphically and colorfully show your present situation on the screen instead of using just text. These graphics Adventures later evolved to allow non-disk users to also have Hi-Res colorful Adventures.

Talking Adventures were introduced which allowed the characters in the Adventures to give you messages or warnings as the games progressed. Programs were even introduced which allowed the non-programmer to "write" Adventures for their friends or for sale using familiar places and objects. One such home-brewed Adventure, *Murder at Longmount High*, has kept many a student busy in the computer lab trying to figure a way out of the school while they discover their teachers dispatched to their final rewards in increasingly gruesome ways.

Pal Creations has released an Adventure program to satisfy the hunger of Adventurists for new challenges to master. Called *Doomsday at 2100*, this one is a toughie — *not* for the beginner.

The premise of this Adventure is that you are a spy with a vital mission. There is a "Middle East Madman" who has developed a germ that, when exposed to the skin, will kill in seconds. He plans to launch a missile carrying that germ at 2100 hours. Scientists have determined that it will take only five days for the world to be wiped out. Your mission: Destroy the missile before 2100 hours. In order to be successful, one has to infiltrate the missile complex, decipher a cryptic message, gain access to high security areas, work with explosives and make your escape.

Unfortunately, this Adventure does not use all of the capabilities of the Color Computer. No graphics, no sound, no speech, and for me, not too much fun.

It does have one very nice operational feature. If the verb used by the player is not contained in the game's vocabulary, the game shows a screen with all the allowable words.

If you are an Adventure player who must master every game, *Doomsday at 2100* will be a new challenge. Otherwise, there are other Adventures which take advantage of the Color Computer's capabilities and still offer quite a challenge.

(Pal Creations, 10456 Amantha Avenue, San Deigo, CA 92126, requires 32K ECB, $14.95)

— Bruce Rothermel

One-Liner Contest Winner . . .

Dave Clouse tells us that he calls his program *Lightning* because he wrote it during a lightning storm.

The listing:

```
0 PMODE4:PCLS:SCREEN1,1:LINE(0,1
80)-(255,180),PSET:LINE(125,156)
-(155,180),PSET,B:DRAW"BM125,156
;E15F15":DRAW"BM132,148;U10R5D6"
:LINE(135,157)-(145,165),PSET,B:
LINE(0,0)-(RND(255),RND(180)),PS
ET:LINE(255,0)-(RND(255),RND(180
)),PSET:GOTO0
```

Dave Clouse
Temperance, MI

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape*.)

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Q.D.S. A/B-4 Is An Outstanding Disk Drive System

Quattro Data Systems brings an outstanding 5¼-inch disk drive system into the Color Computer market. The system consists of a Hard Drive Specialist (HDS) floppy drive controller and two double-sided, double-density Remex RFD480 disk drives. If you are a tape user planning to upgrade to disk, then you should definitely look at this system.

Among the HDS controller's high quality features are gold-plated edge card connectors, absence of potentiometers and dual selectable ROM sockets. The gold edge connectors reduce I/O errors common to boards that are not gold-plated. The absence of pots eliminates the need for user adjustments of the controller. The dual selectable ROM sockets are perhaps the best advantage of this board. You can have a standard Radio Shack ROM in one socket for 100 percent software compatibility and a customized ROM in the other for enhanced operating systems (supporting six ms track-to-track disk speed, for example).

Most enhanced DOSs have a compatibility problem with software written using undocumented Radio Shack disk ROM calls. This board eliminates that problem, because you can now have two ROMs in one controller. There is no external jumper (switch) to select a ROM. However, there is an internal flea jumper to select which ROM you want. This is for the users who use only one ROM. This also eliminates the possible damage to your computer by accidentally hitting the switch.

If you do not wish to have to remove and open the controller, you can install an external SPDT (single-pull double-throw) switch in about four minutes. Just make sure you only switch ROMs when the computer is off and that you mount the switch on the controller in a place where it cannot be accidentally switched. I liked this controller so much that I purchased one at the RAINBOWfest in Chicago and installed my own switch. This controller also carries a 120 day warranty from HDS.

The dual Remex RFD480s are high quality drives. They are double-sided, double-density 40-track drives. They can also run at up to five ms track-to-track disk speed. The feature that makes this particular system so outstanding is not the drives themselves, but the special circuit Quattro Data Systems has installed on the drive board. This circuit intercepts the drive select signal from the controller and changes it so the double-sided drives act like four separate single-sided drives. In other words, the left side drive operates as both Drive 0 and 1, while the right side drive operates as both Drive 2 and 3.

This happens no matter what disk ROM you have in the controller which means you don't have to have a DOS that supports double-sided drives in order to use both sides of the drive. You could have plain Radio Shack DCB 1.1 ROM and still access both sides. Quattro Data Systems warrants the drives for a period of 90 days after purchase.

People who already own disk systems and want two disk ROMs may wish to purchase the HDS controller. People who are planning to upgrade to disk may want to look at the entire package, because they can access both sides of the double-sided drive and still have software compatibility.

Quattro Data Systems also has a trade-in plan for people who have single-sided drives and wish to upgrade to double-sided systems. They have telephone hours for people who work during the day. If you have any questions or would like more information about the system, please call (512) 331-7940 after 8 p.m. Eastern time, 7 p.m. Central time.

I was very impressed by the quality of the system and would recommend it to anyone interested in buying a controller, a pair of disk drives or a complete system. I ran this system for about four weeks and did not experience any problem with either the controller or the drives. I installed a second ROM in the controller and the drives operated fine, and the matter of no external switch is an easy matter to fix if you so prefer.

(Quattro Data Systems, P.O. Box 180071, Austin, TX 78718-0071, $120 for controller, $375 for dual drives)

— John Curl

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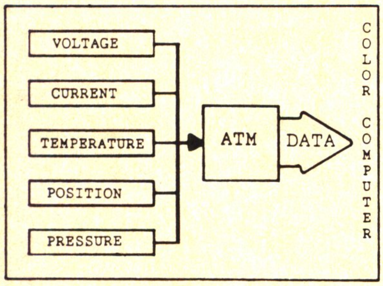

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Dudul Makes Graphics Doodling 'State Of The Art'

In today's software market there is an abundance of graphics drawing programs available. *Dudul*, by Doug Dugan, is one of the newest entries in the field, and although it is similar in many respects to the others, it has definite characteristics that make it stand out as a very well-done, state of the art program.

Dudul is written in Extended BASIC with machine language subroutines, requires a 64K CoCo equipped with a cassette and/or disk and one joystick or mouse. The program is shipped on cassette but will load itself to disk if available. It contains complete I/O routines for both cassette and disk, and the only limitation I found was that it was not JDOS compatible. Last, but by no means least, *Dudul* comes with one of the nicest, most clearly written, illustrated, 44-page user guides I have ever seen.

Dudul, as suggested by its name, is a graphics doodling program. This means that while you can create some pretty sophisticated drawings, they will tend to be less detailed and more coarse, overall, than a drawing created by a program such as *Graphicom* or *CoCo Max*. This, I must point out, is not a problem or limitation; it is just the approach Mr. Dugan has chosen to follow. This results in a relatively easy-to-use, but extremely powerful program for CoCo owners of all ages with or without any inherent artistic skills.

Dudul follows the current state of the art conventions by using icons, drop down menus and a point and click method for all its options. If you are unfamiliar with these terms, an icon is a small drawing used to visually represent a program option. Drop down menus consist of a more detailed list of options that appear, temporarily, over your drawing in response to choosing one of the main menu options. And finally, point and click refers to moving the cursor, a small arrow, to the option desired and pressing the joystick or mouse firebutton to make your choice.

The keyboard is used only in the TEXT option, which I will cover later. To better visualize all of this, you might examine the advertisements in this issue of RAINBOW for similar programs.

All drawing is done in `PMODE 3` in either Color Set 0 (green, yellow, blue and red) or Color Set 1 (buff, cyan, magenta and orange). The various drawing options include lines, boxes, circles and parallelograms, each with its own particular characteristics. You can also paint in solid colors as well as any kind of pattern you can possibly dream up.

The 64K requirement is to allow you to save a copy of your current drawing to the upper 32K, restore it to your work area, or exchange the saved copy with your working drawing. It also provides the means of implementing an UNDO option to restore your drawing should you make a mistake. This allows for a lot of experimental drawing without fear of destroying your creation.

To give you an idea of the depth of this program and its many options, I'll describe the LINE option in more detail. Once you select the option, you are greeted with a drop down menu containing six additional options associated with line drawing. The basic line option allows you to pick a spot on the screen for one end of the line, move the arrow to another spot and press the firebutton to draw the line.

If it's not quite what you had in mind, simply move the arrow over a bit and press the button again. This erases the first line and draws a new line. In fact, by holding the joystick button down, you can achieve "rubber band graphics." Within this and other options you can choose the "reset mode," which allows you to draw multiple lines without returning to the menu each time to reselect the option.

Other line options include drawing several lines from a single point, drawing V-shaped lines, creating many parallel lines and just plain scribbling. In many cases the options may be combined to create even more unusual effects.

In addition to this, the TEXT option allows you to label your graphics with uppercase letters, numbers and a few special characters. Each of the other main options, such as parallelograms, have similar, expanded secondary options.

The paint option allows you to paint in solid colors and also create your own patterns. You are given a 5-by-5 square in which to create the basis of your pattern. Each of the 25 points may then be set to a different color. Furthermore, you may elect to have the pattern painted in any one of five different sizes. Believe me, the effects are quite amazing.

A few final comments are in order before I end this review. First, although no screen dumps to printer are included in the program, detailed information on interfacing such a program is provided. Also, *Dudul* uses a file condensing technique to conserve space in memory, on cassette and on disk. While this is a good idea, it does present a problem in accessing *Dudul* creations by programs other than *Dudul*.

Mr. Dugan has also provided program listings in the manual for displaying all the pictures stored on a cassette or disk. While the listings are very nice, especially for a programmer, I would have liked to have the programs included on the cassette with the *Dudul* program.

In conclusion, with the care that obviously went into the creation of this well-done program and its remarkable user guide, it would be difficult to find any reason not to recommend it, especially to the casual artist or person who likes to "doodle."

(Doug Dugan, 4514 Wichita, St. Louis, MO 63310, cassette $22 plus $2 S/H)

— Ken Boyle

Hint . . .

Formatting Diskettes

Some CoCo users have reported problems with formatting more than one disk in succession. The CoCo uses a technique called "write precompensation" on the more critical inner tracks of a disk; for some reason, Disk BASIC doesn't turn off the feature after a `DSKINI` is completed. If you need to format more than one disk at a time, enter `POKE 113,0` and press the Reset button after each disk.

Software Review

Battle for Tunis: Perfect For The War Game Beginner

If you have never war-gamed, I would suggest *Battle for Tunis* as your first venture into this game genre. However, if you have any aspirations to design your own games some day, take *Battle for Tunis* home and study it!

The program includes a "help" screen of command summaries. It includes an ability to ask for "Close Air Support." It loads rapidly and runs with no problems in both disk and cassette systems. In an unusual move for a 32K war game, it has no game save feature. That in itself is an advantage to the war game newcomer. *Battle for Tunis* plays fully in an hour or less and thus is a good introduction to the sport. (More complex war games often exceed eight hours in length.)

However, to a war gamer, *Battle for Tunis* is contradictory. It appears to have the war gamer's favorite attributes, including accuracy, fidelity, instructional ability and authenticity, and it combines all these with some computer tricks that should give the hacker an excuse to buy it even if he never plays games. The first time I played it, I was impressed with the slick tricks, but I was bored silly; it seemed to lack challenge. Later, I would revise that assessment.

By the third time I had played it, I noticed my CoCo was consistent in beating me, and that a listing of the combat units on both sides (called an "Order of Battle List") showed me to have a ground combat strength advantage of over 15 percent. As the CoCo lacked air support but I had the Luftwaffe, I should outgun him by about 30 percent, at least. Two days later when I finally won, I had learned quite a lot about the battle for Tunis in 1943.

In this game, you are Rommel and the CoCo is Patton, unless, of course, you can find another human player. In that case, the CoCo allows you two choices. That trick alone is worth the price; relatively few computer war games allow two opposing human players.

The game is played with the ground combat units which took part in the 1943 battle in North Africa, and your screen is a semi-graphics terrain map of northern Tunisia. Actually, it is *two* such maps. *Battle for Tunis* is unique among games of this type in being able to teach the difference between "strategy" and "tactics" very clearly.

One map covers the entire country with minimal terrain features and each unit only a pinhead of color — the color denoting nationality. This map is excellent in showing you where the main enemy thrust might come and what parts of your army need reinforcement. The other map provides more terrain and unit detail, providing both the playing board and the local tactical situation. You will find that your strategic and tactical objectives are frequently different; swapping from one map to the other takes one keystroke and is something you will do often.

Another excellent feature is two separate Intelligence Reports. One provides only your own Order of Battle for all your forces; the other provides Order of Battle information on units of both sides, but only over a limited area. Just finding out why these two reports are available and how to use them took me some time. An explanation would require 300 to 400 words, and still would not do the subject as much justice as getting clobbered by your CoCo would. The answer is related to the conflict of strategy and tactics already mentioned.

The instructions, while very brief, are more adequate than most war game instructions. To round out the list of nice touches in *Battle for Tunis*, it even blows a bugle call to announce certain victories.

(Ark Royal Games, P.O. Box 14806, Jacksonville, FL 32238, requires 32K, tape $24.95, disk $27.95)

— H. Larry Elman

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All games require a 32K computer and are graphically portrayed using the semi-graphics 4 mode to depict the battle maps. Tape and Disk compatible. Games are shipped on tape.

Send check or money order to PICOSOFT GAMES, P.O. BOX 35, EIGHTY FOUR, PA 15330; (412) 267-3721. Games are shipped postage paid. PA residents add 6% Tax. No delays for personal checks.

Distributed in Canada by Kelly Software Distributors Ltd., P.O. Box 11932. Edmonton, Alberta T5J 3L1; (403) 421-8003.
Distributed in Australia by Computer Hut Software, 21 Williams Street, Bowen, QLD 4804, (077) 86-2220. Dealer and Author inquiries welcome.

One-Liner Contest Winner . . .

This one-liner deals with one of the major problems of life — mowing the lawn.

The listing:

```
2 PMODE2:DRAW"D30R5U30L5D15L20U7
D14":DIMV(28,34),W(28,34):GET(10
7,95)-(135,128),V,G:GET(10,10)-(
38,44),W,G:SCREEN1,0:LINE(0,0)-(
256,192),PSET,BF:FORN=1TO7:FORX=
1TO23:PUT(A,B)-(A+28,B+34),V,PSE
T:PUT(A,B)-(A+28,B+34),W,PSET:A=
A+10:NEXT:A=0:B=B+30:NEXT
```

Jobe Allen
Stinnett, TX

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape.*)

232 RemotePlus Adds A Big Plus To Your Communications System

232 RemotePlus by EDC Industries is designed as a multi-purpose host communications tool. It may be utilized as a stand-alone host routine or operated as a terminal driver for a BBS system. The bulletin board software may be written in either BASIC or machine language. *232 RemotePlus* operates efficiently in either mode.

Additional hardware is recommended for the operation of this program. The user needs to purchase some type of expansion hardware for the option port on the computer. Also, a 64K computer with Extended BASIC is necessary.

232 RemotePlus has incorporated many features that make this a very desirable program for communications. Error trapping is very functional and is useful for system testing and debugging. System timeout is also a nice feature. This allows for system hang-up if the line does not have any activity for two minutes. This time period is user definable and may be changed. *232 RemotePlus* contains an on-board routine for a mini-terminal program, plus a conversational mode for speaking to system users.

Some of the more specific commands embedded into *232 RemotePlus* include:

ETRAP — Primary error trapping command
Clock Commands — Controls software system clock
PRIV ON — Disables timeouts
CONV — Turns on conservational mode
TERM — Controls mini-terminal mode

I found *232 RemotePlus* to operate efficiently and error free. The user guide contains many development hints and tips to use this program as a bulletin board program. The user guide did not contain any loading instructions for the program. I assume this was an oversight and will be corrected in future editions. *232 RemotePlus* receives a big plus from me.

(EDC Industries, P.O. Box 42718, Los Angeles, CA 90050, $24.95 plus $2.50 S/H)

— Rick Cobello

One-Liner Contest Winner . . .

Just as the baseball season is heating up, here's a one-liner that plays the song "Take Me Out to the Ball Game."

The listing:

```
1 CLS:PRINT@235,"BASEBALL!":PLAY
"T3O3CO4CO3AGEL2GL3DL4CO4CO3AGEL
2GL4AA-AEFGL5AL4FL2DL4AA-ABO4CDO
3BAGEDV20CO4CO3AGFL2GL4DDCDEFGL2
AL4ABO4V25CCCO3BAGG-GL2ABO4C"
```

Joel Lombardi
Newark, DE

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape*.)

Super Voice Really Is Super Sounding

By Bruce Rothermel

When my Color Computer was very young, its vocabulary consisted only of "boops" and "beeps" generated by using the BASIC `SOUND` commands. Later, upon learning the intricacies of the `PLAY` command, it would occasionally play a song.

As it grew up, its first words were spoken using an SC-01 Votrax Speech Pak. Now it can talk and even sing, because it has obtained one of the new Speech Systems Super Voice speech paks which uses the new "third generation" SSI-263 Phonetic Speech Synthesizer.

For those of you who haven't been reading the ads and reviews in THE RAINBOW, yes, your Color Computer can talk! Using a speech synthesizer chip contained in a ROM pack, working in conjunction with a text-to-speech conversion software program, your computer can talk through the television speaker.

What the computer says is controlled either by direct keyboard input or by data embedded in a BASIC or machine language program. Examples of how to easily make your computer talk are given in the well-detailed, 24-page user's guide.

This process has been simplified by the addition of the word "SAY" to the computer's BASIC vocabulary. `10 SAY HELLO , HOW ARE YOU` is a valid BASIC statement which results in the computer enunciating, "Hello (pause) how are you?" It's that easy to add speech to a BASIC program. A more complex, but versatile way is to use the `USR` command. Using `USR`, you can have the computer speak a variable contained in a program.

To get your computer talking for the first time, a BASIC program, *SPEAK*, included with the voice pak, is run. This automatically loads the text-to-speech processor along with a dictionary which is a powerful part of the speech algorithm.

Your first experiments with speech will be using the keyboard direct input mode. Here you type in a word or phrase, hit ENTER and listen to what your computer has to say. You can spend many an hour in this mode trying to see how accurate its pronunciation is.

Other options include:

Direct speech with phonemes printed — After the phrase is spoken, the phonemes that were used for pronunciation are displayed on the screen or printer. Phonemes are the little chunks of sound which we and the computer actually use when we speak. When we say the word "time," our gray matter churns for a few nanoseconds and the word "time" rolls out. When the computer says time, what it is saying is T,AHI,EH,Y,M. These are the phonemes which create the word time. All you do is type the word and it says it using the rules of pronunciation in the text-to-speech converter. You have the opportunity to try different spellings to get a better pronunciation. You can then add the correct pronunciation to the dictionary. More about this later.

Build text from the keyboard — Allows you to save long messages on disk or tape for later recall and pronouncement.

Speak text from a file — Recites back the text previously created.

Screen Echo — In this mode, each alphanumeric character that is printed on the screen can also be spoken. This allows sight-impaired persons to hear the keyboard as they are using the computer. Also in this mode, any program that prints to the screen can now talk (e.g., Adventures, databases, check balancing, etc.).

The program recognizes special characters and numbers. For example, if you put a '$' in front of a numerical string, it assumes you are talking about money; $123.45 will be spoken as "one hundred twenty-three dollars forty-five cents." In larger numbers, it recognizes and speaks out the trillions, billions, millions, thousands, hundreds, etc., contained in numbers as large as 999,999,999,999,999.999. For educational math program applications, 100 * 3 = 300 will be spoken out as "one hundred times three equals three hundred."

The new SSI-263 chip, again combined with a speech-to-text processor, does everything the old SC-01 voice pak does and allows even more control over your computer's articulation. The differences between the SC-01 and the Super Voice are easy to hear, but difficult to explain. With the SC-01, you had four inflection levels which changed immediately when an embedded command was "read" by the translation program. With the SSI-263, there are 4,096 pitch variations (32 levels with eight inflection speeds). You have the capabilities of using these pitch variations to make the computer voice sound more natural.

The ultimate demonstration of these pitch capabilities is having the computer sing. A demo file with Super Voice singing "The Star-Spangled Banner" is included.

The good news is the additional articulation capabilities of the SSI-263. The great news is that Super Voice is compatible with all the programs which have been written for the older SC-01 Votrax Paks and there are quite a few excellent programs: talking Adventures, educational math and spelling programs for kids, even talking smart terminal programs.

Frank De Largy, who wrote the original text-to-speech *TRANSLATE* program for the SC-01, has also written the program for Super Voice. Actually, two text-to-speech programs are included. *TRANSLATE* allows you to use the older programs written for the SC-01s. *SUPERTOK* allows you to use the full capabilities of the new speech synthesizer.

Some of the credit for the words being spoken so clearly must go to the dictionary file. The dictionary has a list of words which do not follow the rules of ordinary pronunciation. Before translating the text-to-speech using the defaults, the dictionary is scanned. If the word is in the exception dictionary, the pronunciation in the dictionary overrides the defaults. The word "one" would be pronounced as "une" if it were not in the dictionary. The completeness of this dictionary is amazing; however, to meet your specific needs, words can be added to the dictionary.

Frank has done some work on *TRANSLATE* since its original release. The default pronunciations now work very nicely on many of the words, where I had to correct the phonemes before. One particularly nice change is the pronounciation of my daughter's name, Bonnie. Instead of "Bone-E," it actually says "Bonnie."

While it is impossible to describe the tonal quality of the computer's speech, the older SC-01, to my ears, sounds like a Swedish immigrant who has lived in New York for the last 10 years. I refer to my older computer voice as "Sven." The newer SSI-263 has much more of an electronic twang. If you've seen a rerun of the old *Battlestar Galactica* series, the voice is reminiscent of the Cylon mechanical bad guys who are always trying to vaporize Lorne Greene and his band of too beautiful people. Both speech paks are very understandable, just different sounding.

If you haven't heard a CoCo talk, attend a RAINBOWfest for a demonstration — but bring money because once you see and hear what a voice pak can add to the capabilities of your Color Computer, you won't leave without one.

(Speech Systems, 38W255 Deerpath Road, Batavia, IL 60510, requires 32K minimum, $79.95)

BASIC COMPILER

WASATCHWARE believes that users of the Color Computer deserve the right to use all 64k of RAM that is available in the computer, and have fast machine language programs that use the full potential of the 6809 microprocessor. That is why the BASIC compiler, called MLBASIC was developed. Here are some of the reasons that make this compiler one of the best bargains in this magazine:

- Programs can use all 64k of RAM for either program storage or for large numbers of variables and arrays like A(20000)
- Full Floating Point arithmetic expressions with functions
- SUBROUTINE and CALL commands allows for structured programming and more independent program development
- Full sequential and direct access disk files allowed
- BASIC source and M.L. output I/O to disk, tape or memory

COMMANDS SUPPORTED

```
1. I/O -Commands
     CLOSE    CLOADM   CSAVEM   DIR      DRIVE    DSKI$
     DSKO$    FIELD    FILES    GET      INPUT    KILL
     LSET     OPEN     PRINT    PUT      RSET

2. Program Control Commands
     CALL     END      EXEC     FOR      STEP     NEXT
     GOSUB    GOTO     IF       THEN     ELSE     ERROR
     ON..GO   RETURN   STOP     SUBROUTINE

3. Math Functions
     ABS      ASC      ATN      COS      CVN      EOF
     EXP      FIX      INSTR    INT      LEN      LOG
     LOC      LOF      PEEK     POINT    PPOINT   RND
     SGN      SIN      SQR      TAN      TIMER    VAL

4. String Functions
     CHR$     INKEY$   LEFT$    MID$     MKN$     RIGHT$
     STR$     STRING$

5. Graphic/Sound Commands
     COLOR    CLS      CIRCLE   DRAW     LINE     PAINT
     PCLEAR   PCLS     PLAY     PMODE    PRESET   PSET
     RESET    SCREEN   SET      SOUND

6. Other/Special Commands
     DATA     DIM      LLIST    MOTOR    POKE     READ
     REM      RESTORE  RUN      TAB      VERIFY   DLD
     DST      IBSHFT   LREG     PCOPY    PMODD    PTV
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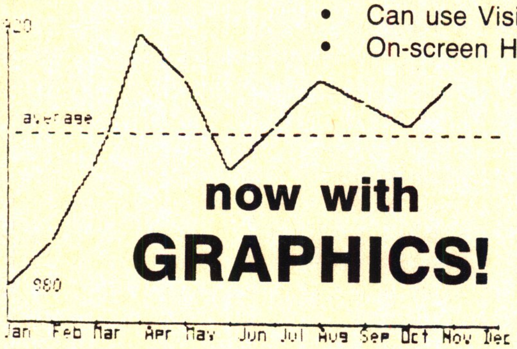

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The Ultimate Color Computer Reference Guide and ToolKit: The Ultimate CoCo Reference

The Ultimate Color Computer Reference Guide and Toolkit — that's one long title for a very useful compilation of BASIC program development information on the CoCo. This package of information is put together in a 395-page manual. The manual is broken down into five sections: "BASIC Command Reference," "Program Optimization Techniques," "BASIC Subroutines," "Machine Language Subroutines" and "Reference Tables." A companion to this is *The Software Kit for the Ultimate Color Computer Reference Guide and Toolkit*. This is a tape or diskette which contains all of the subroutines listed in the manual.

The "BASIC Command Reference" section (206 pages) is a comprehensive reference to all the commands and functions in Color BASIC, Extended Color BASIC and Disk BASIC. The reference manual is not designed to teach BASIC, but as a tool to make it easier to use BASIC.

Each command and function is described with six topics: syntax, purpose, arguments, potential errors, examples and notes/suggestions. The command syntax shows the format of the command, which arguments are required and which are optional. The purpose section describes what the command will do. The arguments section defines each argument of the command. This includes the type of argument, variable, constant, etc., the range of the argument and whether it is required or optional. The topic on potential errors is just that: a short description of possible errors that may be encountered when using the command. The examples section gives several examples of the use of the command. The section on notes/suggestions gives some useful hints on how to use the command.

The next section is "Program Optimization Techniques." This section explains several methods you can use to make your BASIC programs run faster and use less memory. Some of the techniques which are covered include subroutines and subroutine placement, use of machine language subroutines, multiple statement lines and variable placement. This section is very useful for anyone who is concerned about the performance of their BASIC programs.

The third section, "BASIC Subroutines," contains 29 general purpose BASIC subroutines. There is a complete explanation and listing for each of the subroutines. The explanation describes what the routine does, the required input variables and the output variables. There are subroutines to disable the BREAK key, change the printer Baud rate, input the joystick values, do double PEEKs and POKEs, input a line of data and many other useful functions.

The section on "Machine Language Subroutines" contains 13 programs which include a timer function, a clock routine and a search routine. The description of each subroutine is the same as in the BASIC subroutine section.

The section on "Reference Tables" has tables for BASIC key words by function, BASIC error codes and their meaning, and several other useful tables.

The Software Kit, besides containing the BASIC and machine language subroutines, contains several useful utilities. There are utilities to count the occurrences of variables, produce a cross reference of variables, remove comments and produce formatted listings of BASIC programs.

The only problem I found was with a BASIC subroutine to display a number on the high resolution screen. I could not get it to work, even using the example in the manual.

The BASIC and machine language subroutines can be used with Color BASIC, Extended Color BASIC or Disk BASIC and a tape system as well as a disk system. You need to have at least 16K of memory.

I found the "BASIC Command Reference" section extremely useful as a quick guide to BASIC. The subroutines included with the toolkit are practical, useful and timesaving when developing BASIC programs. I would recommend this product to anyone who is serious about writing BASIC programs.

(CMD Micro Computer Services Ltd., 10447 124 Street, Edmonton, Alberta T5N 1R7, *Reference Guide and Toolkit*, $27.95 U.S., $34.95 CDN. plus $3.50 S/H. *The Software Kit*, tape $12.95 U.S., $14.95 CDN., disk $14.95 U.S., $17.95 CDN. plus $1.50 S/H)

— Mike Piotrowski

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MORE KEYS Gives Your Keyboard Added Convenience

One of the features missing on CoCo is a numeric keypad allowing rapid entry of numbers with electronic spreadsheet programs. If you've been in the CoCo Community for a while, you know you just have to wait a couple of months for someone to supply the innovation you've been needing.

Such is the case with MORE KEYS, a numeric keypad manufactured by Moreton Bay Software with 15 keys that plugs inside your CoCo, giving you the convenience of far more expensive computers.

The additional keys are gray on black, matching perfectly the colors of existing keyboards on the older and newer computers. The keys are raised, giving you the feel of the newer CoCo 2 keyboard. The device also aligns nicely with the slope of the keyboard so it fits right in with the decor of your work station.

I found installation of MORE KEYS to be fairly easy, requiring less than 20 minutes for the average do-it-yourselfer. It comes with a two-page set of instructions, complete with illustrations for the 'D,' 'E,' 'F' and CoCo 2 boards.

I own a TDP 100 which uses the 'F' board. In my case, I was instructed to remove the PIA chip which is labeled U17 on the board, making location simple. I added the socket pins from the MORE KEYS connection into that location, then inserted the PIA chip pins on top of the new element, replaced the computer cover to its rightful place and I was in business.

The keys on MORE KEYS are located in the same positions as they are on standard numeric keypads, so I had little difficulty in using them with spreadsheet programs featured in past issues of THE RAINBOW. Even if you're a fairly proficient typist, you know how tedious it is to enter numbers from the regular positions on CoCo's keyboard.

I have no reservations about recommending MORE KEYS for CoCo users who need a good numeric keypad to help improve business productivity.

(Moreton Bay Software, 316 Castillo Street, Santa Barbara, CA 93101, $69.95)

— Charles Springer

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Learn Valuable 'Teaching' Lessons With *School Days*

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Who said teaching would be easy? From the dramatic to the annoying, such incidents are the daily fare of the classroom teacher. You can test your coping skills by playing *School Days* by Tothian Software. You (and up to five other players) must start out as a student teacher and try to advance by becoming first a "regular teacher," then a "master teacher." You win the game by being promoted to "administrator."

In each turn, you must cope with a realistic school incident by selecting one of three suggested actions. Each decision has three consequences: your peace of mind or "tranquility rating," your standing with the school administration and your impact and relationship with students will either increase or decrease.

Occasionally, your day is further disrupted with unexpected visits by the principal, the superintendent and members of the school board. As in real life, the consequences of decisions made in the presence of these notaries are multiplied many times over!

This is a simple game, simply done with enough sound effects and variety of text presentations to add interest. The documentation is brief but adequate; the on-screen instructions are all that is required.

The play value comes from the realism of the concept. Many of the situations in *School Days* have actually happened to me — and most likely to every teacher reading this review. Since the situations, responses and consequence values are stored in `DATA` statements, it is easy to add or alter from your own experience and expand or modify the game.

I did not always agree with the given solutions, but they are common teacher responses. What I disliked was that an action which is best for students (in the game) is worst for your tranquility rating. I felt this was unrealistic because knowing I've helped a student usually makes me feel good. However, teaching is a high-stress profession and the game accurately reflects this.

The game may even have some value in training student teachers. Certainly non-teachers who played it took significantly longer to progress through the game than did teachers. (The game is best played by one or two; more than this takes a long time.)

School Days will be a genuine hit at your next faculty meeting. It would be a good public relations move at a P.T.A. meeting. Play it with your spouse or close friends so they can better understand the demands of your job, but whatever you do, don't show it to your students — there are too many ideas for pranks to pull on the teacher!

(Tothian Software, P.O. Box 663, Rimersburg, PA 16248, 32K ECB required, cassette $19.95)

— T. Gray

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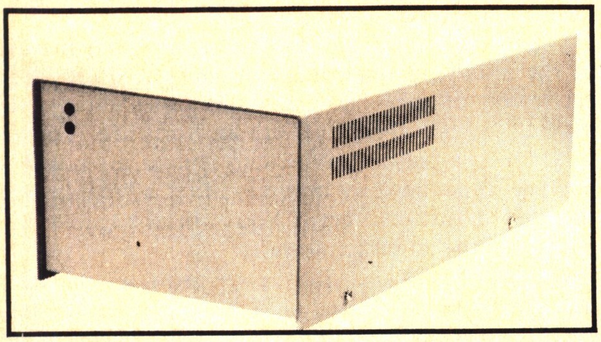

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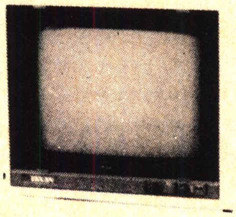

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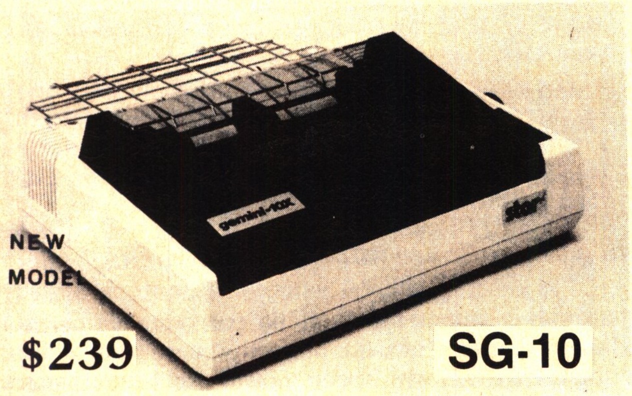

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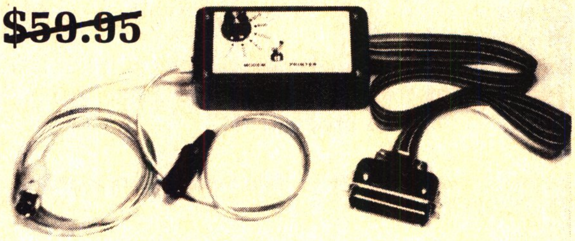

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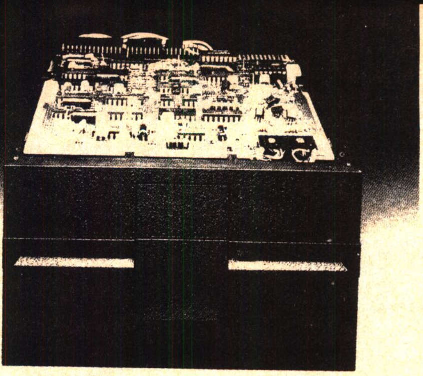

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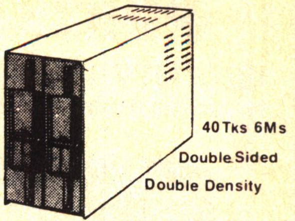

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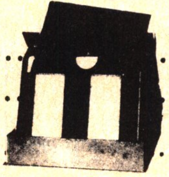

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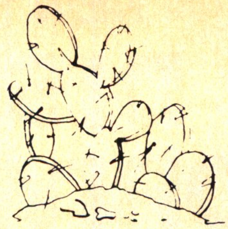

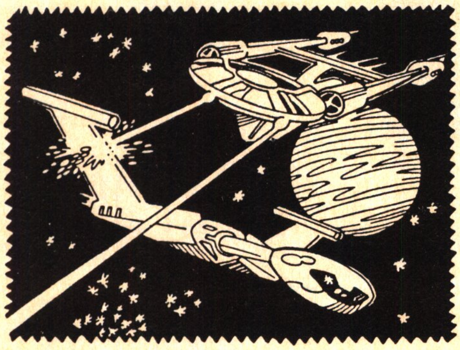

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WARP FACTOR X was written by an engineer for the Kennedy Space Center and has been three years in the making. You will appreciate the attention to detail and complex inner workings of the program. The program is supported by eight pages of documentation important to the success of your mission. Your progress through the eighteen sectors of the galaxy will be recorded and saved for your next adventure into space. **WARP FACTOR X** includes versions for 32K, 64K, and COCO 2. It requires one disk drive and comes packaged in a vinyl library case. **$34.95**

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CORRECTIONS

"Animatic: Automatic Animation" (June 1985, Page 58): There has been some confusion about the *Rocket* and *Promnade* programs. These programs (and any other BASIC programs that use the new ANIM command) should always be saved in ASCII; for example, you can use the command `CSAVE "ROCKET",A`.

If you have saved programs in normal BASIC format (or are using the *Rocket* and *Promnade* files from the June 1985 RAINBOW ON TAPE), load the program, save it in ASCII and use the ASCII copy from now on.

Rita Sabo also tells us that a bug in the main program has been called to her attention. If you typed the *Animatic* program (Listing 4) in by hand, insert a new Line 1551 as follows and reassemble the program.

```
1551        JSR     $A976
```

If you don't have the source code on tape or disk, BASIC programs can be patched by inserting an `EXEC &HA976` in a part of the program that comes before any ANIM commands. This is only necessary for programs that use keyboard input to control movement.

In the *Promnade* program (Listing 2), insert this line:

```
510 IF FL=1 THEN EXEC &HA976:GOTO 40
```

One-Liner Contest Winner . . .

Typerite turns the CoCo into an electronic typewriter. Here are the commands:

m ENTER	—	Reset margin and tab values
t ENTER	—	Tab next line
c ENTER	—	Center next line
ENTER	—	Prints the line (When pressed by itself, it spaces down one line.)
SHIFT	—	Shifts for capital letters and punctuation
Left arrow	—	Backspaces and erases a character
SHIFT Left arrow	—	Erases entire line

The listing:

```
1 CLS:INPUT"MARGIN";M:INPUT"TAB"
;T:S=M:POKE282,0:FORX=1TO2:X=1:C
LS:POKE1024+(80-(S+M)),246:LINEI
NPUTA$:IFA$="m"THEN1ELSEIFA$="c"
THENC=1:NEXTELSEIFA$="t"THENS=T+
M:NEXTELSEIFC=1 THENPRINT#-2,TAB
((80-LEN(A$))/2)A$:C=0:NEXTELSEP
RINT#-2,TAB(S)A$:S=M:NEXT
```

Stan Osterbauer
Sequim, WA

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Adventures* and its companion *Rainbow Adventures Tape.*)

"Analog-To-Digital And Back Again" (June 1985, Page 36): Jeremy Spiller tells us there is an easy way to save digitized audio to tape or disk for later use. Use the command `CSAVEM` (`SAVEM` for disk) `"filename",&H2500,&H795C,&H791F`. This saves both the data and the playback section of the program. To play the data, enter `EXEC`.

"Cardio" (April 1985, Page 58): Rene St. Jacques informs us that he has been getting reports of an FC Error occurring in Line 5010. He passes along the following description to explain how that portion of the program works:

"Once you have determined the string of characters for each letter in a dimensioned array and that you are in graphics mode, you have to place the word to be drawn in A$ and the position, scale and color of the word in OP$. Then the subroutine in Line 5000 will add together the strings of characters for each letter of the word and will draw them. For example, the first three instructions in Line 140 serve to draw the word "CARDIO" at the position X=8, Y=40 at the scale of 14 (see the `DRAW` instruction). I suggest to your readers to do a `TRON` to see where the error comes from and I suggest to them to be especially careful about the ';' character."

Rene also tells us there are two errors in Line 1070. First, the word `GOOTO` should be changed to `GOTO`, and the last command in the line should be `GOSUB 6110` instead of `GOSUB 6080`. He also says that Line 1220 can be omitted.

One-Liner Contest Winner . . .

The first one-liner below asks for a month, day and year, then tells you the day of the week. The second listing asks for a starting and ending date and gives the number of days in between. Both programs accept dates between January 1, 1901 and December 31, 1999. Enter the numbers for the month, day and year; for example, February 21, 1963 can be entered as 2,21,63 or 2,21,1963.

Listing 1:

```
0 IFY<>0THENA=INT(365*Y+L+30*M-3
0+E+D):I=A-7*INT(A/7):PRINTMID$(
"SUNMONTUEWEDTHUFRISAT",I*3+1,3)
:RUNELSEPRINT:INPUT"M,D,Y";M,D,Y
$:Y=VAL(RIGHT$(Y$,2)):L=INT((Y-1
)/4)-(INT(Y/4)=Y/4ANDM>2):IFM<3T
HENE=M-1:GOTO0ELSEE=INT((M-3.7)/
1.7):GOTO0
```

Listing 2:

```
0 J=J+1:IFJ=2ORJ=4THENI=INT(365*
Y+L+30*M-30+E+D):IFJ=2THENK=I:GO
TO0ELSEPRINTI-K"DAYS":PRINT:RUNE
LSEINPUT"M,D,Y";M,D,Y$:Y=VAL(RIG
HT$(Y$,2)):L=INT((Y-1)/4)-(INT(Y
/4)=Y/4ANDM>2):IFM<3THENE=M-1:GO
TO0ELSEE=INT((M-3.7)/1.7):GOTO0
```

Ed Samuels
New York, NY

(For these winning one-liner entries, the author has been sent copies of *The Rainbow Book Of Simulations*, its companion *Rainbow Simulations Tape*, *The Rainbow Book of Adventures* and its companion *Rainbow Adventures Tape.*)

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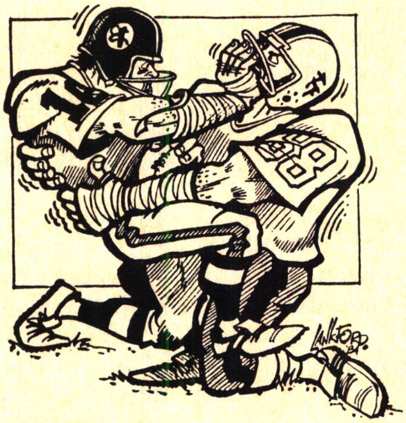

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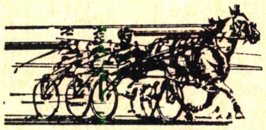

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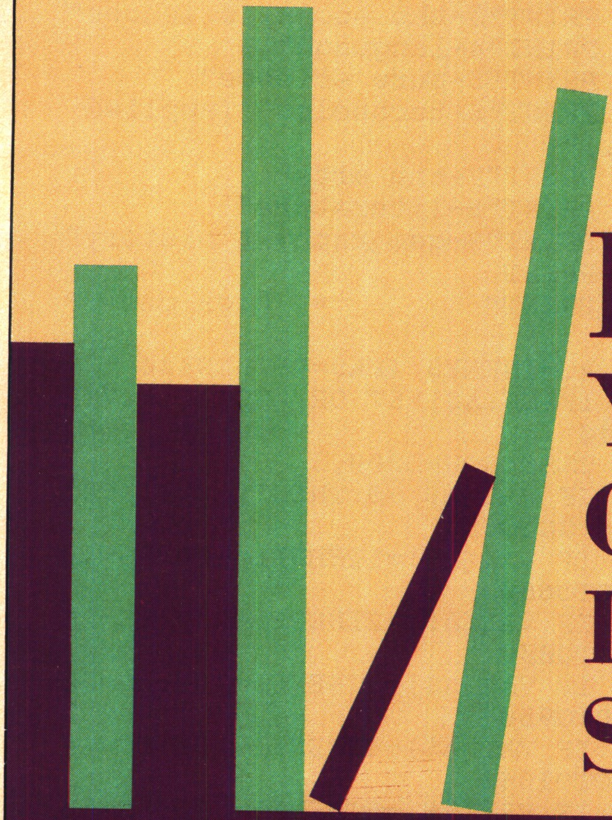

Bookmark: Your Very Own Computerized Dewey Decimal System

By Robert Mauro

If you're someone who uses the public library a lot and if you're often intimidated and/or annoyed by that cumbersome card catalog, *Bookmark* is just the program you've been waiting for.

The library card catalog is fine if no one is using the drawer you need or if you have a specific title or author in mind. But what if you just might like to browse through American fiction, astronomy or European history? In many libraries, just trying to locate the fiction or astronomy shelf can really wear you out, but no more — thanks to *Bookmark*.

(Robert Mauro, whose company, CompuRAM, sells games and educational programs for the CoCo, is a free-lance writer. Among other projects, he edits newsletters for the Long Island Center for Independent Living and the Association for Better Conditions for the Disabled — all on the Color Computer.)

Fortunately, public libraries all over the world use a single standardized mathematical cataloging system invented by, no, not John Dewey, the well-known American educator and philosopher, but Melvil Dewey, the lesser-known American librarian who invented the Dewey Decimal System back in 1876. Thanks, Mel!

Thanks to his "system of 10s," I have been able to create the following helpful computer program to pinpoint exactly where, for example, that American fiction or astronomy shelf is. *Bookmark* even gives a printout of two Dewey Decimal numbers to look between for the book you want.

No more will you have to wait to have your library computerized or for that Ph.D. research fellow looking up 20 or 30 volumes to give back the very card catalog drawer you need. Type in *Bookmark* and enjoy your local library once again!

Following is the program breakdown:

Line Number	Notes
20-150	Draws colorful billboard
150-310	Explains *Bookmark*
320-540	Selects general categories and sets up first Dewey decimal
550-1830	Lets you choose specific area of interest
1840-1930	Sets up last Dewey decimals and asks if you want a printout
1940-2060	Displays two Dewey decimal numbers on screen to look between and gives you a printout if so desired

(For any questions regarding this program, Robert may be reached at 257 Center Lane, Levittown, NY 11756. Please include a SASE.)

110	89	1280	197
340	172	1490	88
510	202	1660	241
690	181	1850	78
860	201	2010	224
1100	154	END	122

The listing: BOOKMARK

```
10 REM BOOKMARK (C) Robert Mauro
, 257 Center Lane, Levittown, NY
 11756
20 CLS0:V=2:H=23
30 FORL=1TO10
40 SOUNDRND(250),RND(3)
50 SET(23,V,RND(8)):SET(24,V,RND
(8)):SET(32,V,RND(8)):SET(31,V,R
ND(8)):SET(37,V,RND(8)):SET(38,V
,RND(8)):SET(H,6,RND(8)):SET(H,5
,RND(8)):V=V+1:H=H+1:NEXTL
60 PRINT@324,"  WELCOME TO BOOKM
ARK  ";
70 PRINT@384,"THE COMPUTERIZED D
EWEY DECIMAL";
75 FORMM=11TO14:FORMH=16TO19:SET
(MM,MH,5):NEXTMH:NEXTMM
76 FORWW=47TO50:FORWD=16TO19:SET
(WW,WD,5):NEXTWD:NEXTWW
77 FORHD=18TO19:SET(10,HD,5):NEX
THD
78 FORPL=18TO19:SET(51,PL,5):NEX
TPL
80 PRINT@428,"SYSTEM";
90 FORBS=15TO46
100 C=RND(8)
105 IFC=5THEN100
110 FORBH=19TO19-(RND(3)+3)STEP-
1
120 SET(BS,BH,C)
130 NEXTBH
140 NEXTBS
150 FORGG=1TO3900:NEXTGG
160 CLS:PRINT:PRINT"    FOLLOWI
NG IS A LIST OF"
170 PRINT"          CATEGORIES"
180 PRINT"  FROM THE DEWEY DECIM
AL SYSTEM"
190 PRINT"              OF"
200 PRINT"     LIBRARY CLASSIFIC
ATION."
210 PRINT"           FOLLOW THE"
220 PRINT"  STEPS & YOU'LL HAVE
LESS OF"
230 PRINT"           A NEED TO"
240 PRINT"       USE THE BORING
CARD"
250 PRINT"       CATALOGUE IN YO
UR"
260 PRINT"       -- OR ANY -- LIB
RARY!"
270 PRINT
280 PRINT
290 PRINT"       PRESS 'S' TO BE
GIN"
300 B$=INKEY$:IFB$<>"S"THEN300
310 CLS0:SOUND200,2
320 PRINT:PRINT"0-generalities"
330 PRINT"1-philosophy & related
 areas"
340 PRINT"2-religion"
350 PRINT"3-the social sciences"
360 PRINT"4-language"
370 PRINT"5-pure science"
380 PRINT"6-technology (applied
sci.)"
390 PRINT"7-the arts"
400 PRINT"8-literature"
410 PRINT"9-geography & history"
420 PRINT
430 PRINT"        *  pick one  *
       "
440 A$=INKEY$:IFA$=""THEN440
446 IFASC(A$)>57 OR ASC(A$)<47TH
EN440
448 CLS0:SOUND200,2
450 IF VAL(A$)=0 THENFL=000.000:
LS=0:GOTO550
460 IF VAL(A$)=1THENFL=100:LS=10
0:GOTO680
470 IF VAL(A$)=2THENFL=200:LS=20
0:GOTO800
480 IF VAL(A$)=3THENFL=300:LS=30
0:GOTO950
490 IF VAL(A$)=4THENFL=400:LS=40
0:GOTO1060
500 IF VAL(A$)=5THENFL=500:LS=50
0:GOTO1200
510 IF VAL(A$)=6THENFL=600:LS=60
0:GOTO1320
520 IF VAL(A$)=7THENFL=700:LS=70
0:GOTO1450
530 IF VAL(A$)=8THENFL=800:LS=80
0:GOTO1580
540 IF VAL(A$)=9THENFL=900:LS=90
0:GOTO1720
550 PRINT"1-BIBLIOGRAPHIES & CAT
ALOGS"
560 PRINT"2-LIBRARY & INFORMATIO
N SCIENCES"
570 PRINT"3-GENERAL ENCYCLOPEDIC
 WORKS"
580 PRINT"4-GENERAL ENCYCLOPEDIC
 WORKS
590 PRINT"5-GENERAL SERIAL PUBLI
CATIONS"
600 PRINT"6-GENERAL ORGANIZATION
S"
610 PRINT"          & MUSEUMS"
620 PRINT"7-JOURNALISM, PUBLISHI
NG,"
630 PRINT"        NEWSPAPERS"
```

```
640 PRINT"8-GENERAL COLLECTIONS"
650 PRINT"9-MANUSCRIPTS & RARE B
OOKS"
660 PRINT
670 PRINT"       * PICK ONE *
 ":GOTO1830
680 PRINT"1-METAPHYSICS"
690 PRINT"2-KNOWLEDGE, CAUSE, PU
RPOSE,"
700 PRINT"         MAN"
710 PRINT"3-POPULAR: PARAPSYCH.,
 OCCULT"
720 PRINT"4-SPECIFIC PHILOSOPHIC
AL VIEWS"
730 PRINT"5-PSYCHOLOHY"
740 PRINT"6-LOGIC"
750 PRINT"7-ETHICS (MORAL PHILOS
OPHY)"
760 PRINT"8-ANCIENT, MEDIEVAL, O
RIENTAL"
770 PRINT"9-MODERN WESTERN PHILO
SOPHY"
780 PRINT
790 PRINT"      * PICK ONE *":GO
TO1830
800 PRINT"1-NATURAL RELIGION"
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820 PRINT"3-CHRISTIAN DOCTRINAL
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830 PRINT"4-CHRISTIAN MORAL & DE
VOTIONAL"
840 PRINT"5-LOCAL CHURCH & RELIG
IOUS"
850 PRINT"          ORDERS"
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CAL"
870 PRINT"        THEOLOGY"
880 PRINT"7-HISTORY & GEOGRAPHY
OF"
890 PRINT"          CHURCH"
900 PRINT"8-CHRISTIAN DENOMINATI
ONS"
910 PRINT"        & SECTS"
920 PRINT"9-OTHER RELIGIONS & CO
MPARATIVE"
930 PRINT
940 PRINT"       * PICK ONE *":G
OTO1830
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960 PRINT"2-POLITICAL SCIENCE"
970 PRINT"3-ECONOMICS"
980 PRINT"4-LAW"
990 PRINT"5-PUBLIC ADMINISTRATIO
N"
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SERVICE"
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GUAGES"
1090 PRINT"3-GERMANIC LANGUAGES"
1100 PRINT"4-FRENCH, PROVENCAL,
CATALAN"
1110 PRINT"5-ITALIAN, ROMANIAN,"
1120 PRINT"         RHAETO-ROMAN
TIC"
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E"
1140 PRINT"             LANGUAGE
S"
1150 PRINT"7-ITALIC LANGUAGES &
LATIN"
1160 PRINT"8-HELENIC & CLASSICAL
 GREEK"
1170 PRINT"9-OTHER LANGUAGES"
1180 PRINT
1190 PRINT"       * PICK ONE *":
GOTO1830
1200 PRINT"1-MATHEMATICS"
1210 PRINT"2-ASTRONOMY & ALLIED
SCIENCES"
1220 PRINT"3-PHYSICS"
1230 PRINT"4-CHEMISTRY & ALLIED
SCIENCES"
1240 PRINT"5-SCIENCES OF EARTH &
 OTHER"
1250 PRINT"              WORLDS"
1260 PRINT"6-PALEONTOLOGY"
1270 PRINT"7-LIFE SCIENCES"
1280 PRINT"8-BOTANICAL SCIENCES"
1290 PRINT"9-ZOOLOGICAL SCIENCES
"
1300 PRINT
1310 PRINT"       * PICK ONE *":
GOTO1830
1320 PRINT"1-MEDICAL SCIENCES"
1330 PRINT"2-ENGINEERING & ALLIE
D"
1340 PRINT"          OPERATIONS"
1350 PRINT"3-AGRICULTURE & RELAT
ED"
1360 PRINT"4-HOME ECONOMICS"
1370 PRINT"5-MANAGERIAL SERVICES
"
1380 PRINT"6-CHEMICAL & RELATED"
1390 PRINT"         TECHNOLOGIES
"
1400 PRINT"7-MANUFACTURES"
1410 PRINT"8-MISCELLANEOUS MANUF
ACTURES"
1420 PRINT"9-BUILDINGS"
1430 PRINT
1440 PRINT"      * PICK ONE *":G
OTO1830
1450 PRINT"1-CIVIC & LANDSCAPE A
RT"
1460 PRINT"2-ARCHITECTURE"
1470 PRINT"3-PLASTIC ARTS & SCUL
PTURE"
1480 PRINT"4-DRAWING, DECORATIVE
 &"
1490 PRINT"          MINOR ARTS"
1500 PRINT"5-PAINTING & PAINTING
S"
1510 PRINT"6-GRAPHIC ARTS (PRINT
S)"
1520 PRINT"7-PHOTOGRAPHY & PHOTO
GRAPHS"
1530 PRINT"8-MUSIC"
1540 PRINT"9-RECREATIONAL & PERF
ORMING"
1550 PRINT"               ARTS"
1560 PRINT
1570 PRINT"       * PICK ONE *":
GOTO1830
1580 PRINT"1-AMERICAN LITERATURE
"
1590 PRINT"2-ENGLISH &"
1600 PRINT"  ANGLO-SAXON LITERAT
URE"
1610 PRINT"3-LIT. OF GERMANIC LA
NGUAGES"
1620 PRINT"4-FRENCH, PROVENCAL,
```

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```
CATALAN"
1630 PRINT"5-ITALIAN, ROMANIAN,"
1640 PRINT"        RHAETO-ROMANTI
C"
1650 PRINT"6-SPANISH & PORTUGUES
E LIT."
1660 PRINT"7-ITALIC LANGUAGES"
1670 PRINT"            LITERATURE
 (LATIN)"
1680 PRINT"8-HELLENIC LANGUAGES
LIT."
1690 PRINT"9-LIT. OF OTHER LANGU
AGES"
1700 PRINT
1710 PRINT"        * PICK ONE *":
GOTO1830
1720 PRINT"1-GENERAL GEOGRAPHY (
TRAVEL)"
1730 PRINT"2-BIOGRAPHY,GENEALOGY
,INSIGNIA"
1740 PRINT"3-HISTORY OF ANCIENT
WORLD"
1750 PRINT"4-HISTORY OF EUROPE"
1760 PRINT"5-HISTORY OF ASIA"
1770 PRINT"6-HISTORY OF AFRICA"
1780 PRINT"7-HISTORY OF NORTH AM
ERICA"
1790 PRINT"8-HISTORY OF SOUTH AM
ERICA"
1800 PRINT"9-HISTORY OF OTHER AR
EAS"
1810 PRINT
1820 PRINT"        * PICK ONE *":
GOTO1830
1830 P$=INKEY$:IFP$=""THEN1830
1835 IFVAL(P$)>9ORVAL(P$)<0THEN1
830
1840 IFVAL(P$)=1THENB=10
1850 IFVAL(P$)=2THENB=20
1860 IFVAL(P$)=3THENB=30
1870 IFVAL(P$)=4THENB=40
1880 IFVAL(P$)=5THENB=50
1890 IFVAL(P$)=6THENB=60
1900 IFVAL(P$)=7THENB=70
1910 IFVAL(P$)=8THENB=80
1929 IFVAL(P$)=9THENB=90
1930 PRINT"   DO YOU WANT A PRIN
T OUT Y/N"
1940 PO$=INKEY$
1950 IFPO$="Y"THENCLS:SOUND200,1
:GOTO1980
1960 IFPO$="N"THENCLS:SOUND200,1
:GOTO1980
1970 IFPO$<>"Y"ORPO$<>"N"THEN194
0
1980 IFFL=0THEN2020ELSE1990
1990 IFPO$="N"THEN2010
2000 PRINT#-2,"LOOK BETWEEN DEWE
Y DECIMAL # ";FL+B;" AND ";FL+(B
+9.999);" ON THE LIBRARY SHELVES
.":PRINT#-2,"IF NOT THERE, TRY L
OOKING BETWEEN # ";LS;" AND ";LS
+9.999;" ON THE SHELVES."
2010 CLS8:PRINT"  LOOK BETWEEN D
EWEY DECIMAL #   ";FL+B;" AND ";
FL+(B+9.999);" ON THE
 LIBRARY SHELVES.":PRINT" IF NOT
 THERE, TRY BETWEEN ";LS;" AND "
;LS+9.999;" ON THE SHELVES.":END
2020 IFPO$="Y"THEN2050
2030 IFPO$="N"THEN2060
2040 IFPO$<>"Y"ORPO$<>"N"THEN194
0
2050 PRINT#-2,"LOOK BETWEEN DEWE
Y DECIMAL # ";"ZERO ";B;" AND ";
"ZERO";B+9.999;" ON THE LIBRARY
SHELVES.":PRINT#-2,"IF NOT THERE
, TRY BETWEEN ZERO ZERO ZERO AND
 ZERO ZERO ";9.999;" ON THE SHEL
VES"
2060 CLS8:PRINT"   LOOK BETWEEN
DEWEY DECIMAL # ";"ZERO";FL+B;"
AND ";"ZERO";FL+(B+9.999);" ON T
HE          LIBRARY SHELVES":PRI
NT" IF NOT THERE, TRY BETWEEN ZE
RO   ZERO ZERO AND ZERO ZERO";9.
999;"          ON THE SHELVES"
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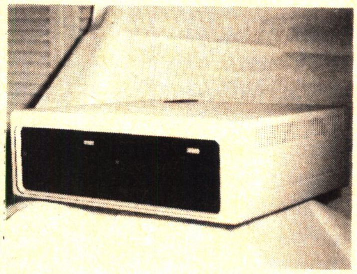
THANKS RAINBOWFEST CHICAGO!



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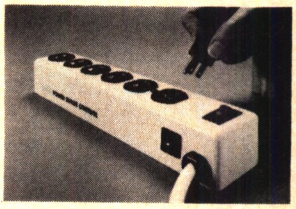

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Making CoCo Shine With More LEDs

By Tony DiStefano
Rainbow Contributing Editor

It seems to me a lot of people like to do projects that light up or make noise. The projects I get the most response from are the ones that involve LEDs (Light Emitting Diodes). Well, who am I to argue with my readers? (I'll let you in on a little secret — I like them, too!) In order to keep my readers happy, here is another one.

This month's project is a two-fold project, and maybe a little more. The first part involves three LEDs. These LEDs will be connected to the RS-232 port. The second part is a Reset button mounted up front. A Reset button up front may not be a new idea, but the way I do it the wires will not get in anyone's way. The part about "maybe a little more" means that if ever you want to add more things to your "cover," there are leftover wires. If you are confused, read on; it is all explained in this month's article.

The Color Computer's RS-232 port has four wires, three lines and one ground. There are two inputs and one output. As so labeled by Radio Shack, the two inputs are RS-232 "IN" and Carrier Detect, "CD." The third line is an output known as the RS-232 "OUT."

These three lines can take the standard RS-232C levels. The "level" in this case means at what voltage level the computer considers a logic level of one (logic level HI) or logic level of zero (logic level LO). The levels for standard RS-232C are plus 12 volts (+12V) and minus 12 volts (-12V). These levels are maximum levels. The Color Computer also has one RS-232 output. The standard for RS-232C output is also plus/minus 12 volts.

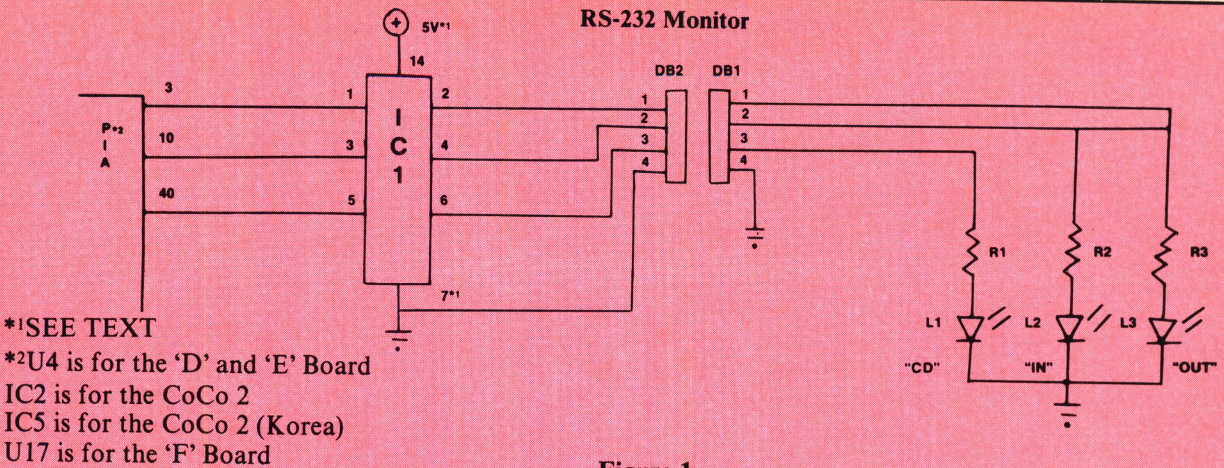
"If you find the LEDs never light, try soldering them in backwards."

Now, here is where the interesting part begins. According to the EIA (Electronic Industries Association), a voltage above plus three volts shall be considered a logical one and a voltage below minus three volts shall be considered a logical zero. Any voltage in between these two limits will be considered undefined. That means if a voltage is 12 volts and on its way down, the logic level will not change from a one to a zero until it reaches minus three volts. The same is true for a voltage on its way up.

As far as the RS-232 is concerned, there are essentially two Color Computers. All of the "big" Color Computers (the older gray or white models) are the same. All of the "small" Color Computer 2s are also the same. They differ only in the output voltage levels. The CoCo outputs the full plus/minus 12 volts, while the CoCo 2 only outputs plus/minus five volts. On the input side, the CoCo can safely handle plus/minus 12 volts while the CoCo 2 can take up to plus/minus 25 volts.

I mentioned that the voltage levels less than three volts and greater than minus three volts are undefined. This is done to improve the reliability of RS-232 communications. It improves the noise margin level. For example, a signal that fluctuates a volt or two will not pass threshhold level; therefore will not produce false data.

(Tony DiStefano is well-known as an early specialist in computer hardware projects. He lives in Laval Ouest, Quebec.)



*[1]SEE TEXT
*[2]U4 is for the 'D' and 'E' Board
IC2 is for the CoCo 2
IC5 is for the CoCo 2 (Korea)
U17 is for the 'F' Board

Figure 1

This method of transmitting data is more reliable, but the electronic circuitry needed is also more expensive to produce. Radio Shack did not spend the extra money. Instead, they made a circuit that has no margin of safety. In the case of the CoCo, any voltage greater than 2.6 volts is considered to be a logic level of one, and any voltage less that 2.6 is considered to be a logic level of zero. The CoCo 2's voltage level is also 2.6, but I think on some CoCo 2s it is set to 2.0 volts.

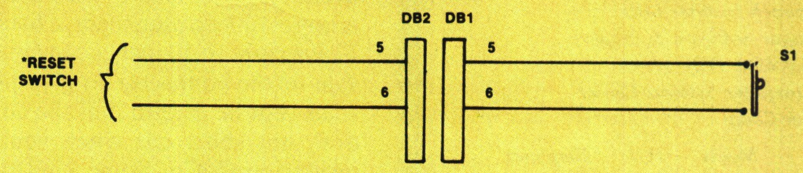
That takes care of the "ins" and "outs" of RS-232 in the Color Computer; now let's get down to the hardware part. I have had several letters and phone calls about RS-232 compatibility between the CoCo 2 and the CoCo, or the CoCo 2 and some other peripheral such as a modem. This may not solve your problem, but it will focus on whether or not the computer is the problem because this month's project is an RS-232 monitor. Since there are only three lines on the CoCo's RS-232, you will need three LEDs.

The schematic in Figure 1 shows the simple circuit involved in building the RS-232 monitor. The chip I used is a TTL (Transistor-Transistor-Logic) chip. I used a buffer/inverter to drive the LEDs. Only three of the six buffer/inverters are used; the other three are unused and are free to be used in another project.

The inputs to these buffers come from the PIA (Peripheral Interface Adapter) that controls the RS-232. I took the signals from these points because the voltage levels are compatible with the TTL chip used. Also, these points are the points the computer sees and not what is coming in on the RS-232 lines.

The chip I used inverts the signal. I did it that way because on power-up, all three signals on my computer are ones. Normally that would mean all the LEDs would be on. To me, that is a bit distracting. The inverter turned all the LEDs off when I powered up.

The logic here is that everything is off until you use something. For instance, when the printer is online, the "IN" LED would light up. Another example is when my modem is on, the "CD" LED is on when there is a carrier — not the other way around. If the LED says there is a zero (by being on) the computer sees a one. This way you can visually see exactly what the computer reads and writes. You will be able to see, at a glance, whether your modem



*SEE TEXT

Figure 2

Corporation Plus is a fast paced arcade styled game combining skill, strategy and luck. In the course of the game, players may buy and sell corporations, invest in the stock market, buy lottery tickets, lose or gain capital in situations on the board or go bankrupt.

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See Rainbow review September issue.
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is online, your printer is busy or when the computer is transmitting something. All in all, it monitors all RS-232 functions.

If you don't like the fact that the LED information is inversed, there is a simple way to change it. First, reverse all the LEDs' polarity by plugging them in backwards and, instead of connecting the other (common) side to ground, connect it to the five-volt side. This will inverse the inverter, giving you a non-inversed signal. When you see the LED on, there is a one on the RS-232 line in question. Do it whichever way you choose.

This is the major part of the project, but equally important are how and where the LEDs are mounted. I mounted the three LEDs on the top cover of my CoCo. At first thought, there is nothing unusual about this, but if you are like me, the cover is always unscrewed. I must pull the cover off my computer at least a dozen times a week. If I have a lot of wires going to the cover, chances are a few of them will break off before the week is out, so I put in a connector. That way, when I remove the cover to dive into my CoCo, all I have to do is disconnect it and the cover is completely removable. It is a good idea that saves resoldering the wires every time one breaks off.

Though any connector can be used, I used a DB-9 male and a DB-9 female for two reasons: 1) They are both available from Radio Shack, and 2) It is impossible to plug them in backwards. Leave eight to 10 inches of wire on each side of the connector to give plenty of slack, but be careful that the connector does not short out when you stuff it inside the CoCo. Some kind of sleeve would be good. The chip can be mounted on an optional piece of protoboard or glued upside-down on top of the PIA. Again, this is your choice.

The rest of the circuit is quite straightforward. If you find the LEDs never light, try soldering them in backwards. I always have trouble finding the anode to those things. Some people have expressed difficulty in finding where to connect to get plus five volts and ground. A good place to find plus five volts is on Pin 9 of the edge connector. Finding Pin 9 is simple. Start from the back of the connector (the part closest to the rear of the computer) and count the top pins 1, 3, 5, 7 and 9, and there you are. Ground is on Pin 33; count the same way.

As an added bonus to the RS-232 monitor, I added a Reset switch in the front of my computer. The circuit in Figure 2 shows how to add it in. Mount the switch on the front cover on whichever side that suits your needs. Use two of the unused pins on the DB-9 connector to do the wiring, so that way you can disconnect it from the computer at the same time you disconnect the LEDs.

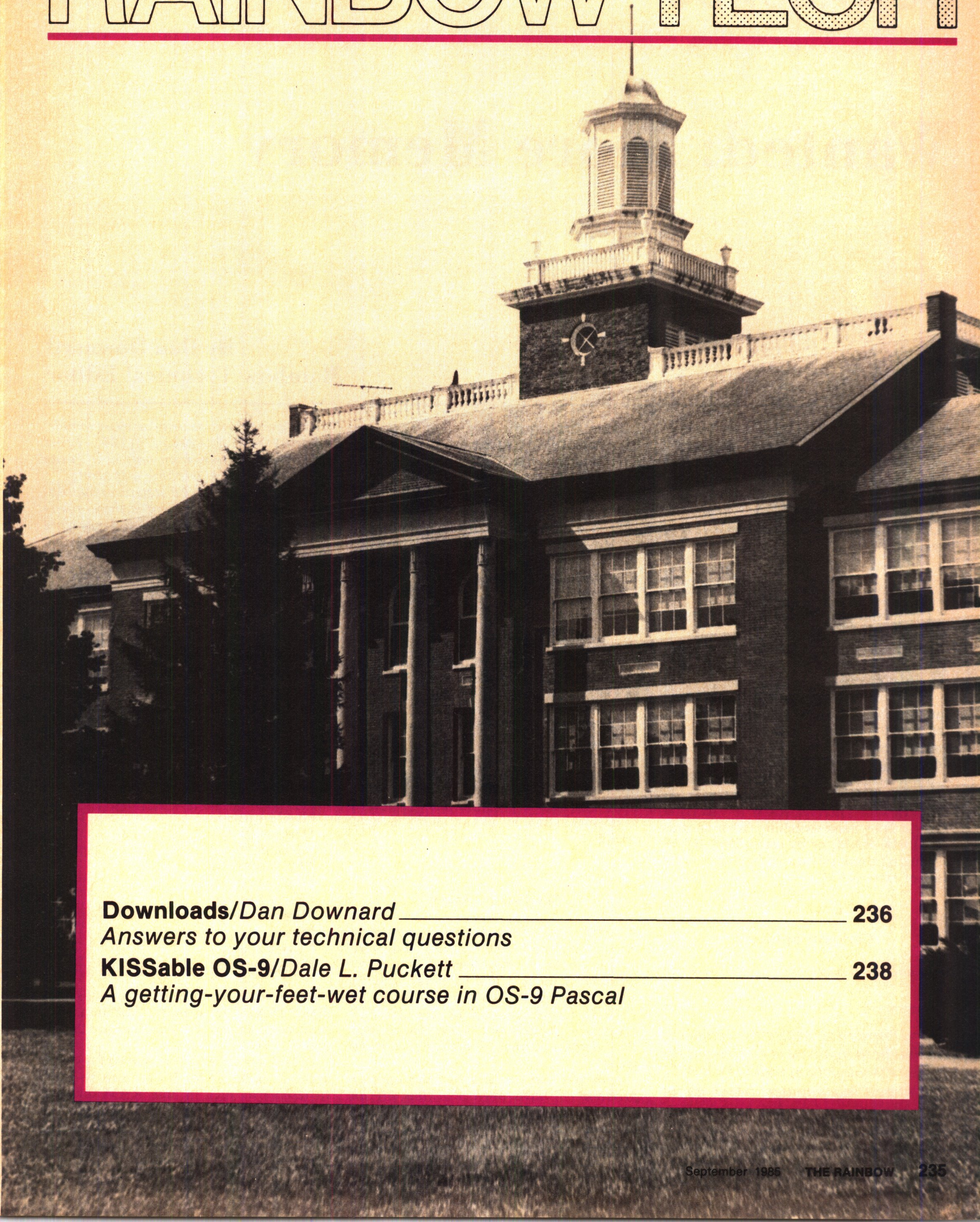
There are about as many different reset switches as there are different CoCos. Some of them have six pins, and some have only two. The one that has only two is easy to wire; put one on each and there you go. The ones that have six pins are a bit different. The easiest way to figure out which one is which is use a short piece of wire. With the computer on, touch any two pins on the reset switch with each end of the wire. When a reset occurs, those are the two pins to use.

In closing, I would like to mention that you have been very good in limiting phone calls to Monday nights. For those of you who missed it, my "Monday-night-only" number is (514) 473-4910. If you want to write me and expect an answer, please include a self-addressed, stamped envelope; otherwise I'll take it as just a comment.

Parts List

ID	Description	Radio Shack Number
R1,2,3	100 ohms ¼ watt	271-1311
IC1	74LS04 or 7404	276-1802
L1,2,3	LED (with mount)	276-018
DB1	Sub-D Male	276-1537
DB2	Sub-D Female	276-1538
S1	SPST Momentary	275-1547
Miscellaneous	Wire, solder, protoboard, etc.	

RAINBOW TECH



Downloads/*Dan Downard* ______ 236

Answers to your technical questions

KISSable OS-9/*Dale L. Puckett* ______ 238

A getting-your-feet-wet course in OS-9 Pascal

RAINBOWTECH

DOWNLOADS

Wanted: More Memory

By Dan Downard
Rainbow Technical Editor

• *I have a 16K CoCo 2 and have recently upgraded to Extended* BASIC. *Before the upgrade* `PRINT MEM` *gave me 14631, but now it gives me 8487. Why? Now I am thinking of upgrading to 64K and would like to know if I could make a plug-in pack of my old 16K chips to give me an additional 16K of memory.*

Wayne Towe
Mosheim, TN

The reason you are getting less memory with Extended BASIC, Wayne, is that more memory is being reserved for graphics pages. Try a `PCLEAR 1` and see if that doesn't help the situation.

In the case of your old 16K chips, I have found no use for them yet, unless you can sell them to someone with a 4K CoCo. When you upgrade to 64K you are at the maximum addressing limit of the CoCo.

Some schemes are available for adding more than 64K of memory to the CoCo (see the review of *Thunder RAM* in this issue, Page 209) by bank switching either another set of 64K RAM, or by using 256K RAM. I wouldn't think this would be practical for 16K of extra RAM.

Curiously Speaking

• *I am new subscriber to* RAINBOW. *While looking through the programs in my first issue (April 1985), I found a command I'm not familiar with:* `EXEC44539`. *I looked through my* BASIC *manual and couldn't find this command. Can you please tell me what it is?*

In that same issue, I was reading about the Adventure contest. You (the magazine, that is) said something about list-guard. I have been wondering how to do this for a long time. Could you please tell me how?

Roy Geeo
Hot Springs, AR

According to *500 Pokes, Peeks 'N Execs*, `EXEC44539` waits for a keystroke. It is used as a substitute for the following:

```
10 A$=INKEYS:IF A$="" THEN 10
```

If you want to foil someone's attempt to `LIST` or `LLIST` your Adventure, or any other BASIC program, Roy, try adding `POKE 383, 158` into a program line. To return to normal listing, hit BREAK and then `POKE 383,0`.

The Family 'String'

• *First, I want to thank you for answering my letter on "ASCII aggravation." You were correct about the problem in the cassette recorder. That is a place I never thought it would be. I replaced it with Radio Shack's CCR-82 Computer cassette recorder and, except for the new not being able to read the old now and then, everything is working great.*

Now if I can ask you to solve another problem. I have been working on an ancestry program where I store names and personal data in strings. I would `CLEAR 10000` *and dimension three arrays, example:* `(DIM A$(200),B$(200),C$(200)`. *I find that even with 64K I am only able to use about 15K of it for working with strings.*

Am I using the `CLEAR` *statement improperly or is it necessary, and is there a way to access more of the memory so I may store names and personal data on about 200 people?*

Rodney Lee Gibbons
Fairmont, WV

Rodney, there seem to be quite a few other readers with the same question from the looks of the mailbag this month. Rather than answer your question directly, let's take a look at memory allocated for programs in general.

A typical memory map for a Disk BASIC CoCo would have blocks of RAM from $0000 to $7FFF in the following order:

*RAM Pointers
*Screen memory
*RAM variables
*Disk buffers
*Graphics pages
*BASIC program
*Variable storage
*Array Storage
*Free memory
*Stack
*String space
*User reserved

There are a number of commands that affect changes in memory allocation. The most common BASIC commands are `CLEAR` and `PCLEAR`.

`CLEAR` sets the address reserved for string space in high RAM. It can also be used to reserve an area in high RAM for user programs, usually machine language routines. Upon BASIC initialization, 200 bytes

---

(Dan Downard is an electrical engineer and has been involved in electronics for 25 years through ham radio [K4KWT]. His interest in computers began about six years ago and he has built several 68XX systems.)

are automatically CLEARed for string space. Essentially, CLEAR defines the address between the stack and string space. If an extension is used such as CLEAR 1000,&H7000 it also defines the address starting the area called "User reserved."

PCLEAR allocates the number of graphics pages of RAM. Each page is equal to 1.5K. As you can see from the memory map, this is an area of low RAM between the disk buffers and the start of the BASIC program. Four graphics pages, or 6K of RAM, are PCLEARed during BASIC initialization.

The question most people are asking is how to allocate more memory for BASIC programs. You could possibly CLEAR1, but this would not allow any space for string variables. The safest thing to do is leave the default 200 bytes alone by not using a CLEAR statement in your program. At the same time, if you are not using Hi-Res graphics, a PCLEAR1 will give you an additional 4.5K of memory for your program and variables.

In your case, you are getting strings and arrays confused. A DIM command allocates memory for arrays. As you can see from the memory map, arrays use a different part of memory than strings. I would omit the CLEAR command and see if that doesn't help.

Banishing Rumors

- *As I'm sure everybody has heard, Radio Shack has talked about making a 128K CoCo, but then somebody came out with a way to make the current CoCo have 128K and the rumors subsided.*

Now the rumors are that a new CoCo is coming out which is compatible with the Commodore and Atari computers. Is this possible, and if so, what happens to all of us with the old CoCos? We just get dropped down the tubes or what?

If they come out with this new CoCo, could we take the new ROMs and put them in our CoCos to make them compatible? If this is possible, could we not take the Atari or Commodore ROMs and build sort of a switcher to use their software, too?

John Gormley
Imlay City, MI

The CoCo you are using at present has outlasted several versions of Commodore and Atari computers, John. Why do you want to change? I think the rumors you are hearing probably refer to graphics capability, as the computers you mention do not use the same microprocessor as the CoCo.

I still say I have seen better software for the CoCo than the Atari and Commodore combined. If you are serious about transferring machine language programs, and have time to burn, it is possible to transfer programs to the CoCo by the use of a cross-assembler. To do this, though, you have to be an expert assembly language programmer, and also have an understanding of the hardware used in both machines.

I don't foresee your CoCo becoming obsolete.

REMedy for Reserving Memory?

- *Various programs in* THE RAINBOW *require that a* PCLEAR *be entered prior to* CLOAD*ing the program, such as* PCLEAR1. *I understand this tells the computer to reserve a certain area of memory different than the standard default size. However, could you explain why this has to be done before* CLOAD*ing the program rather than simply placing it in the first non-*REM *line of coding? Couldn't the memory be set by a simple program line the same as* DIM *statements are made?*

David G. Manning
Battle Creek, MI

David, your problem is similar to the previous one, but the answer falls under another category. When you load a BASIC program from tape or disk, the program occupies the area immediately above the RAM reserved for graphics pages. If the program is very long there is a possibility you may run out of free memory, hence an ?OM Error. By using a PCLEAR command before loading the program, the maximum space available is allocated.

There is nothing wrong with using PCLEAR in a BASIC program, as long as the program will load in the first place. BASIC has a relocater subroutine in ROM that takes care of of moving the program if more graphics memory is required.

Another reason for using a PCLEAR before loading a program is a bug in the Extended BASIC 1.0. The PCLEAR command didn't function properly. To bypass this bug you had to do the following:

```
1 GOTO1000:REM FIRST LINE OF PROGRAM
2 REM PROGRAM START
. . .
. . .
1000 PCLEAR1:GOTO 2 REM LAST LINE OF
     PROGRAM
```

Slow Poke

- *My 16-month-old son loves to "play" with our Color Computer, except all the games go too fast for him. I know there is a famous speed-up* POKE. *Is there an (infamous) slow-down* POKE?

John H. Abrams
Bellerose, NY

I assume the speed-up POKE you are referring to is POKE65495,0. This POKE increases the CPU rate from .9 to 1.8 MHz, John. To get back to the normal speed you simply POKE65494,0. It's not always that easy, though. The speed-up POKE is usually hidden in the program somewhere, and the easiest way to slow a program down is just to eliminate the speed-up POKE in the first place.

To the best of our knowledge, there is no way to actually slow down the "clock speed" of the CPU to less than the normal rate. Programming techniques such as "delay loops" could slow the action, but there's no quick fix.

DSKCON Distress

- *Help! I have been trying to use DSKCON, the machine language I/O routine the Disk Operating Manual talks about in the "Technical Information Section" in the back of the book. I have found out how to get the thing to* EXEC, *but I can't change any of the parameters. The* EXEC *address is 55135 (dec.).*

Dave Bell
Smithfield, UT

I can assure you that DSKCON indeed works Dave, as I have used it frequently in routines. The secret is knowing the locations in low RAM where the variables (parameters) are stored. Try the following addresses:

$EA-DCOPC	Operation code
$EB-DCDRV	Drive number
$EC-DCTRK	Track number
$ED-DCSEC	Sector number
$EE-DCBPT	Data pointer
$F0-DCSTA	Status byte

In my Disk manual the example loads the 'X' register with the parameter pointer at address $C006. This address happens to point to $EA.

After loading the proper parameters into the above bytes, you must jump to the DSKCON subroutine at $D66C for Disk BASIC 1.0, or $D75F for Disk BASIC 1.1. The 256 bytes of data will be transferred to the address you specified (DCBPT). A safer way of using DSKCON is by using indirect addressing, such as JSR [$C004]. This will work for any version of Disk BASIC.

Putting it on Paper

- *I have recently purchased a Radio Shack graphics* X-PAD *for my Color Computer. I enjoy it very much, but I would like to know if you can tell me how I can dump the graphics to the printer. I cannot find any information in the manual on this.*

Dan Cole
Sepulveda, CA

As far as I can tell, Dan, any screen dump program will work. After you exit any program, the graphics screens still exist in memory. You didn't mention the type of printer you have. Make sure the screen dump program is compatible with your printer.

Your technical questions are welcomed. Please address them to: Downloads, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We reserve the right to publish only questions of general interest and to edit for space and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

KISSable OS-9

A Getting-Your-Feet-Wet Course In OS-9 Pascal

By Dale L. Puckett
Rainbow Contributing Editor

One of the only frustrations that comes with writing a column like this is the realization that you no longer have time to do much programming. This month, I fought back. You'll find the prose short and the listings long — and, not just one listing, either. Our "how-to-get-your-feet-wet" course in OS-9 PASCAL includes seven programs. All of them are filters and most are small tools you can use together to get big jobs done.

In addition to the PASCAL programs I prepared for the tutorial, we are listing one assembly language program, one BASIC09 program and four C programs contributed by our readers. We included the assembly and BASIC09 listings because they show you two more ways to solve a problem we tackled with the PASCAL programs.

Mark W. Smith of Latonia, Ky., contributed the assembly language programs, *upper.a* and *uppercase.b*. Robert J. Apida of San Diego, Calif., sent in the other C listings to show us how he got his feet wet with a new language. When he finished his first programs, Bob had a few new tools, had learned how to run the OS-9 C compiler and had lost his fear of another programming language. He hopes his examples will help you get started with C, too.

(Dale L. Puckett is a free-lance writer and programmer who has worked with the Motorola family of microprocessors since 1976. He is the author of The Official BASIC09 Tour Guide, *published by Microware and* The Official Rainbow Guide to OS-9, *published through the Rainbow Bookshelf. He serves on the InfoWorld Software Review Board and is a chief warrant officer in the U.S. Coast Guard.)*

OS-9 PASCAL is a Pleasure

We approached OS-9 PASCAL slowly by testing several versions of a few common algorithms you'll find in almost all PASCAL programs. The first, *charecho*, simply reads a character from the OS-9 standard input path and writes it to the standard output path.

OS-9 PASCAL always assigns the standard PASCAL files, *input, output* and *syserr*, to the OS-9 standard input, standard output and standard error output files, respectively. This makes it very handy for writing filters that work well within OS-9 pipelines. The same programs can also be used with OS-9's redirection operators, meaning you can write some very versatile tools.

We used our favorite editor and typed the source code for *charecho* into a text file with the same name, then we compiled it using the following OS-9 command line.

```
OS9: pascal <charecho
```

Notice here that you must always use the input redirection operator when you compile a PASCAL program. You must also have the program files *Pascal, Pascals* and *Pascaln* in your current execution directory, /d0/CMDS, when you are programming in PASCAL. The compiler printed a listing of the program on our terminal while it was compiling. We have included a listing of *charecho-two* to show you what they look like.

Why did we need a second attempt? Well, we tested the program using an OS-9 command line like this:

```
OS9: pascaln pcodef
```

Notice here that you *do not* use the redirection operator when you run your PASCAL p-code programs. Notice also that the compiler stores your p-code in a file named *pcodef* in your current data directory. You can rename it after you have your program debugged, or you can use the compiler's 'O' command line options to give the *pcode* file another name.

Since we didn't instruct our program otherwise in the command line above, it took its input from the OS-9 standard input path, our keyboard, and echoed it on the standard output path — the screen. After watching it echo several lines we typed in by hand, we decided to test the redirection. To do that we used a command line like this.

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```
OS9: pascaln pcodef <charecho
```

By the way, we could have also used this command line.

```
OS9: list charecho ! pascaln
     pcodef
```

Take your choice of command line syntax, but before you get too excited about our program, take a look and see what it did when it read our nicely formatted source code listing. Would you believe it removed all the carriage returns from the file? Oh well, if at first you don't succeed, try again. That's one way to learn how a compiler operates.

We called our second program *charechotwo* (didn't want to be too original). If you study the listing, you'll see how we solved the missing carriage return problem. And, there's another teaching point in the listing.

Take a look at the third line from the bottom of the listing where we call a procedure named "INTERACTIVE." This procedure is unique to OS-9 PASCAL. It's a handy extension to the ISO standard because it makes it easy for you to write a program that will work the same with a sequential device — your terminal for example — or a random access file device like your disk drives. Sequential devices use the OS-9 SCF file manager module. Random storage devices use RBF.

Why should you care? Well, each file manager handles the character buffer a little differently; because of this, the EOLN and EOF flag can become true at different times on the two file managers. This means a program written for an SCF device may act strangely when reading characters from an RBF device. The opposite is almost always true.

The procedure INTERACTIVE tests the file you are using at the time. If you are using a sequential device like your terminal, it returns "true" and the program line in the listing will get the next character so you can check to see if it is the end of a line (EOLN) or the end of your file (EOF). If you are reading a file from one of your disk drives, however, INTERACTIVE will return a value of "false" and OS-9 PASCAL won't GET the extra character. Nifty, huh?

Following the source code listing, you'll see the output of the OS-9 compiler.It is easy to look at and gives you a lot of information. If you're strong on form and like things lined up neatly, you could even indent the different levels of your program so they fall under the number on the header line that matches their nesting level. We did it with *charechotwo* just for the fun of it. However, it caused us to notice that the nesting level shown in the third column of this listing agrees with the number in the header line. This could sure come in handy if you get lost in your logic and can't follow your program.

Run one of the two command lines below and you should see a clone of your original source code on your screen. Our copy output the listing below the compiler's listing.

```
OS9: pascaln pcodef <charecho
OS9: list charecho ! pascaln
     pcodef
```

You may echo characters from the keyboard to the screen by typing:

```
OS9: pascaln pcodef
```

Or, you may echo characters from your keyboard to your printer with this command line:

```
OS9: pascaln pcodef >/p
```

All of the command lines above assume that the file *pcodef*, which is stored in your current data directory by the compiler, contains the p-code generated from the source code file named *charechotwo*. Remember, each time you run the compiler it writes new *pcodef* code over the code in any existing *pcodef* file in your current data directory.

After finishing the primitive character echo program, we moved on to a couple of character counting routines. The first one shows you the characters in each line as it counts them and then gives you a final total. The latter skips the listing and simply counts and reports the number of characters and the number of lines in your file. It's a program of few words.

In *charecho* and *charechotwo* we only had to define one variable, achar. In *charcount* and *charcounttwo* we had to add three variables of type integer — charsinline, totalchars and numoflines. Notice the similarity of PASCAL and BASIC09. You must define your variables in both languages, but as you start to program in PASCAL you'll find that it makes you play by the rules. If you don't, the compiler doesn't hesitate to call foul and print an error message on the screen.

We moved next to the program *wordcount*. If you run this one side by side with the "wc" utility we published in C several months ago, you'll notice you get the same answers. Amazing, I must have had a lucky day!

We added the PASCAL CONST statement to this program. It is similar to the DEFINE statement in C. Simply stated, it assigns a value to a word. In *wordcount*, every time the compiler sees the word space it will insert the value of an ASCII space — it's hidden there between the two single quote marks.

Likewise, when the compiler sees the character string cr, it will substitute the decimal value 13, and when it sees tab, it will substitute a value of nine. We also introduced a Boolean variable in this program. When the program is

Listing 1:

```
program charecho (input, output);

var
   achar: CHAR;

BEGIN (* main *)

      WHILE NOT EOF(INPUT) DO

                BEGIN
                READ(input, achar);
                WRITE(output, achar);
                END

END.
------------------------------------------------------------------------
program charecho (input, output);  var    achar: CHAR;  BEGIN (* main *)  WHILE NOT EOF(INPUT) D
O     BEGIN      READ(input, achar);     WRITE(output, achar);    END  END.
********************************************************************************
********************************************************************************
program charechotwo (input, output);

var
   achar: CHAR;
```

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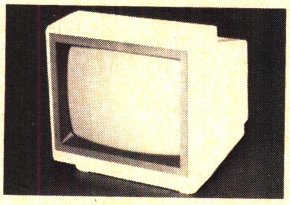

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running, "inword" can only have one of two values at a given time — it can be true or it can be false.

If you are brave, I challenge you to type in the IF statement without using the OS-9 PASCAL built-in function, CHR. Go ahead, compile it. What happened? I bet you got an error message about the value you were trying to assign to the variable achar. Did the compiler tell you it was the wrong type?

That experiment will show you just how finicky PASCAL is about data typing. You must have your act together when you use this language. In the long run that's probably good because your programs will probably run better and your debugging sessions will be shorter — once you get the plot. To try the experiment, replace the line in the program with the following line:

```
IF (achar = space) OR (achar =
linefeed) OR (achar = tab) OR
(achar =cr) THEN inword := FALSE
```

Do you understand why you are getting the error message? In a nutshell, you have defined the variable achar to be of type char. But, on the other hand, you assigned integer values to the names linefeed, tab and cr; PASCAL caught you. To make the types agree, you must use the CHR functions which convert the integer value of your variables to a char value.

Incidentally, the program *wordcount* is based on the theory that if you are reading a text file, you must be in a word — in which case the variable inword is TRUE. Or, you must be *not* in a word and the value of inword is FALSE. Every time you change the value, or state, of this variable you have hit a new word, so you count it.

The programs *upper* and *lower* illustrate two different ways to translate

```
BEGIN (* This is the main program *)

          WHILE NOT EOF(INPUT) DO (* we must read the entire file *)

                    BEGIN (* We want to echo each character a line at a time *)

                    WHILE NOT EOLN(INPUT) DO

                              BEGIN
                              READ(input, achar);
                              WRITE(output, achar);
                              END;  (* we have echoed all except CR *)
                                    (* So we must echo it *)

                    WRITELN;
                    READLN;
                    IF INTERACTIVE(input) THEN GET(input);
                    END  (* we have completed a line *)

                    END.  (* This is the end of the main program *)
---------------------------------------------------------------------------

 Page   1  84/06/30 20:45:25  OS-9 Pascal - RS Version 02.00.00
 STMT  PLOC LEV
-----+------+--+---------1---------2---------3---------4---------5---------6
    1     0D  0 program charechotwo (input, output);
    2     0D  0
    3     0D  0 var
    4     0D  0    achar: CHAR;
    5    -1D  0
    6    -1D  0 BEGIN (* This is the main program *)
    7      3  1
    8      6  1           WHILE NOT EOF(INPUT) DO (* we must read the entire fi
    9     15  2
   10     18  2                     BEGIN (* We want to echo each character a l
   11     21  2
   12     24  2                     WHILE NOT EOLN(INPUT) DO
   13     34  3
   14     37  3                               BEGIN
   15     40  3                               READ(input, achar);
   16     50  3                               WRITE(output, achar);
   17     62  3                               END;  (* we have echoed all excep
   18     68  2                                     (* So we must echo it *)
   19     71  2
   20     74  2                     WRITELN;
   21     80  2                     READLN;
   22     86  2                     IF INTERACTIVE(input) THEN GET(input);
   23     99  2                     END  (* we have completed a line *)
   24    102  2
   25    105  2                     END.  (* This is the end of the main progra

 Page   2  84/06/30 20:45:25  OS-9 Pascal - RS Version 02.00.00
 STMT  PLOC LEV
-----+------+--+---------1---------2---------3---------4---------5---------6
PROC NAME        PSEC  PSIZE  LOCAL  STACK   CSEC  CSIZE
   0 CHARECHO       1    110      3     16      2      0
                         110      3     16             0

25 Lines of source code compiled with no errors found
------------------------------------------------------------------------------
program charecho (input, output);

var
```

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characters in a text file. If you study *upper* closely, you'll find it is very similar to the BASIC09 program named *uppercase*, which is also listed in this month's column. In both programs we are converting every lowercase character to an uppercase character. If a character in the file is already uppercase or is not in the alphabet, our program simply outputs it as is.

We make the conversion by subtracting the decimal value 32 from the value of the lowercase character. To see how it works, work the problem by hand with a lowercase 'a.' This character has a value of 61 Hex. When we subtract 32 decimal from it, we are also subtracting 20 Hex. When you subtract 20 Hex from 61 Hex you get 41 Hex. Now look up 41 Hex in an ASCII code table. Did you find an 'A'?

Now you know how the OS-9 PASCAL and BASIC09 programs work. To see how to solve the problem at the assembly language level take a close look at the *upper.a* listing submitted by Mark Smith. Hopefully, by studying the programs in this issue together, you will be able to understand how the many different high level languages we have available with the OS-9 operating system relate to each other. By comparing the higher level versions to the assembly language version you can get a better idea of what the machine has to do to make a particular computation.

The program *lower* works basically the same way as *upper*. However, with it we show you how PASCAL's sets make it easier to program certain operations. For example, compare the two lines below.

```
IF (achar >= 'a') AND (achar <=
'z') THEN (* It's lower *)

IF achar IN ['A' .. 'Z'] THEN (*
It's uppercase *)
```

If you are interested in the C programming language, study Mark Smith's C program called *asc*. It will convert all characters in a file to uppercase or to lowercase. You tell it what you want in the OS-9 command line. Mark reads this parameter from the command line and takes the proper action within the program.

The C variables "argc" and "argv" are at the heart of the decision. They also had me completely confused for many months before I finally figured out what they were: argc is C shorthand for argument count; argv is short for

```
   achar: CHAR;

BEGIN (* main *)

WHILE NOT EOF(INPUT) DO

   BEGIN
     READ(input, achar);
     WRITE(output, achar);
   END

END.
******************************************************************************
******************************************************************************
program charcount (input, output);

var
   achar: CHAR;
   charsinline: integer;
   totalchars:  integer;
   numoflines:  integer;

BEGIN (* This is the main program *)

totalchars := 0;
numoflines := 0;

     WHILE NOT EOF(INPUT) DO (* we must read the entire file *)

        BEGIN (* We want to echo each character, one line at a time *)

          charsinline := 0;
          WHILE NOT EOLN(INPUT) DO

              BEGIN
                READ(input, achar);
                WRITE(output, achar);
                charsinline := charsinline + 1
              END;  (* we have counted all character except carriage return*)

 (* Now let's report the number of characters in the line *)

   WRITELN( '     (', charsinline:1, 'characters)' );
   READLN;        (* Now we'll get another line *)
   IF INTERACTIVE(input) THEN GET(input);
 (* We must now add the characters in this line to the total *)

   totalchars := totalchars + charsinline;

 (* and we must count the line *)

   numoflines := numoflines + 1

   END;  (* we have completed a line *)

WRITELN;
WRITELN( 'We have counted ', numoflines:1, ' lines containing ',
         totalchars:1, ' total characters.' )

END.  (* This is the end of the main program *)

******************************************************************************
******************************************************************************
PROGRAM wordcount (input, output);

CONST
  space = ' ';
  cr = 13;
  linefeed = 10;
  tab = 9;

VAR
  numwords : integer;
  achar    : char;
  inword   : boolean;

BEGIN (* main program *)

   numwords := 0;
   inword := FALSE;

   WHILE NOT EOF(input) DO
      BEGIN
        achar := getchar(input);
        IF (achar = space) OR (achar = CHR(linefeed)) OR
           (achar = CHR(tab)) OR (achar = CHR(cr)) THEN
```

THE X-TEAM FOR OS-9

XTERM

XTERM is a full featured OS-9 communications program that takes full advantage of the power of OS-9. It works with the normal text screen, XSCREEN, or the Wordpak 80 column board.

XTERM is menu oriented for ease of use, it is simple to use even for the novice OS-9 user. And yet, XTERM is powerful enough for the expert OS-9 user.

Some of the features of XTERM include: full upload and download support with remote buffer operation; supports XON/XOFF protocol; 110/300/600/1200 baud, 5/6/7/8 bits, even/odd/no parity, full or half duplex; able to execute an OS-9 shell command from within XTERM.

XTERM works with a Color Computer using the standard serial interface, but also will work with a hardware serial port. Also, if you are using a hardware parallel printer port, you can print data to the printer as it is received.

XTERM $59.95

XMENU

XMENU is a system that creates a menu-driven environment for the Color Computer using OS-9. OS-9 now becomes easy-to-use with command selections made from menus. Menus are included to access OS-9 commands. An easy-to-use utility is provided that allows for the creation and maintenance of menus.

XMENU works with XSCREEN, the normal text screen, O-PAK, and the WORDPAK 80-column board.

XMENU 29.95

XSCREEN

XSCREEN creates a high resolution screen for the Color Computer using OS-9. This high resolution screen gives you 24 lines of text with 51, 64, or 85 characters per line. Characters can be either white on a black background or vice versa. Easy menu operation.

XSCREEN $19.95

XWORD

XWORD is a powerful word processing system for the Color Computer using OS-9. XWORD is feature packed with only a few features mentioned here.

Some of the editing features of XWORD include: true character oriented full screen editor; works with the normal text screen, XSCREEN, O-PAK, or WORDPAK 80 column card; full block commands with blocks displayed in inverse characters (except with normal text screen) for easy block manipulation; file size not limited to a buffer size; full find and replace commands with wildcard character; able to execute an OS-9 shell command in the middle of editing. Many, many more features, too many to mention here.

Some of the formatting features of XWORD include: proportional spacing supported; perfectly aligned hanging indents and columns, even when using proportional characters; full printer control with control of character size, emphasized, italics, overstrike, underlining (with or without spaces), super and sub-scripts; up to 10 header/footers; page numbering in decimal or Roman numerals; margins and headers can be set differently for even and odd pages; automatically reads printer initialization file to define XWORD for your printer (many included, and easy to write or modify your own). Many more features.

XWORD $79.95

XMERGE

XMERGE gives XWORD powerful mail merge capabilities. With it you are able to merge in data from a data file or from the keyboard to get professional looking results.

XMERGE 29.95 NEW

XDIR & XCAL

A package of two powerful utilities you won't want to be without. XDIR is an OS-9 directory program that prints full hierarchical directories. The directory does full sorting and has complete pattern matching, including wildcard and character classes.

XCAL is a powerful calculator for OS-9. Ideal for both programmers and for general use. XCAL features include: work in decimal, hexadecimal, binary; previous 25 results are stored; functions include AND, OR, NOT, XOR.

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Why a Lowerkit? Because uppercase-only display is a relic of the user-unfriendly past. And because you can't really read a checkerboard excuse for lowercase display. Sure, software lowercase comes with a handful of commercial programs. But software lowercase gobbles up over 6,000 bytes of your precious memory. Even if you have 64K, you'll give up 10% of it for a simple lowercase display. And software lowercase vanishes when you change programs or turn off your computer.

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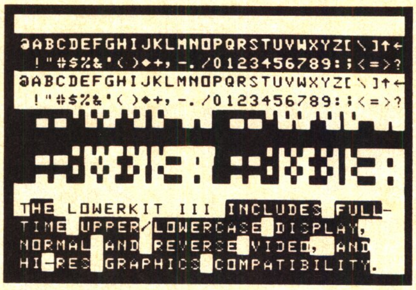
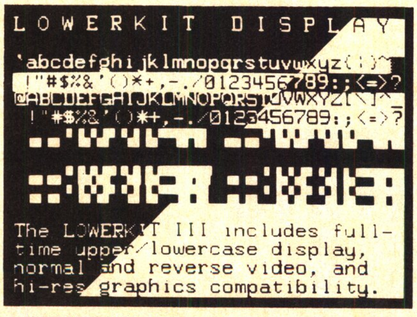
And now, the new Lowerkit III includes a reverse screen switch as well. Big, bright green letters on a black background.



```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]↑←
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]↑←
 !"#$%&'()*+,-./0123456789:;<=>?

THE LOWERKIT III INCLUDES FULL-
TIME UPPER/LOWERCASE DISPLAY,
NORMAL AND REVERSE VIDEO, AND
HI-RES GRAPHICS COMPATIBILITY.
```

Original Color Computer Display



```
LOWERKIT DISPLAY

`abcdefghijklmnopqrstuvwxyz{|}~
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?

The LOWERKIT III includes full-
time upper/lowercase display,
normal and reverse video, and
hi-res graphics compatibility.
```

LOWERKIT III Display (reverse video, too)

Four years ago, the Lowerkit made history and set the standard in Color Computer lowercase. For example, game and education programs from Sugar Software have Lowerkit display options. Spectrosystems' ADOS supports the Lowerkit; so does Cer-Comp's TextPro. Cartridge Scripsit looks beautiful with a Lowerkit. Spectrum Projects, Cheshire Cat and many others have developed beautiful alternate character sets which you can download from Micronet, burn into an EPROM, and snap into your Lowerkit.

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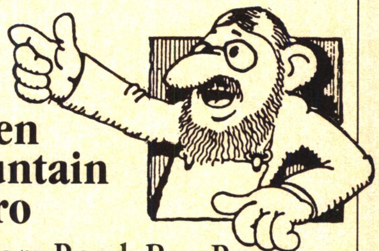

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```
            inword := FALSE
        ELSE IF (NOT inword) THEN
           BEGIN
           inword := true;
           numwords := numwords + 1
           END
      END;
WRITELN;
WRITELN( 'We have found ', numwords:1, ' words in your file.' )

END.

****************************************************************************
****************************************************************************
program upper (input, output);

CONST
   toupper = 32;

VAR
   achar: CHAR;

BEGIN (* main *)

WHILE NOT EOF(INPUT) DO

  BEGIN
    WHILE NOT EOLN(input) DO
      BEGIN
(* Just before we quit, we'll report the totals *)
(* But to get a true count of the number or characters *)
(* in the file, we must add the number of carriage *)
(* to the total *)

totalchars := totalchars + numoflines;
WRITELN;
WRITELN( 'We counted ', numoflines:1, ' lines containing ',
        totalchars:1, ' total characters.' )

END.  (* This is the end of the main program *)

****************************************************************************
****************************************************************************
program charcounttwo (input, output);

var
   achar: CHAR;
   charsinline: integer;
   totalchars:  integer;
   numoflines:  integer;

BEGIN (* This is the main program *)

totalchars := 0;
numoflines := 0;

     WHILE NOT EOF(INPUT) DO (* we must read the entire file *)

        BEGIN (* We must count each character in a line *)

          charsinline := 0;
          WHILE NOT EOLN(INPUT) DO

             BEGIN
               READ(input, achar);
               charsinline := charsinline + 1
             END;  (* we have counted all character except carriage return*)

   READLN;        (* Now we'll get another line *)
   IF INTERACTIVE(input) THEN GET(input);

(* We must now add the characters in this line to the total *)

   totalchars := totalchars + charsinline;

(* and we must count the line *)

   numoflines := numoflines + 1

   END;  (* we have counted all characters *)

(* Just before we quit, we'll report the totals *)
(* But to get a true count of the number or characters *)
(* in the file, we must add the number of carriage *)
(* returns to the total *)

totalchars := totalchars + numoflines;
```

argument value. Once I figured this out, I felt better.

I recently saw a long conversation on the CompuServe OS-9 SIG led by John Heywood. John really got to the heart of the matter. I'm passing his description along because I think it will help you. It's one of the best descriptions of argc and argv I've ever seen, and I've scanned several books on the subject. Let's start by looking at a couple of definitions you'll find in almost every UNIX-style C program.

```
main(argc,argv)
int argc;
char **argv   or   *argv[ ]
```

The definition of argc is fairly obvious on the surface — it contains the value of the number of arguments on a C command line, but argv is another story. First, look at the C word "**argv." In English it means argv is a pointer to a pointer to a character. If you can think in terms of two levels of indirection clearly, John has really put the story in a nutshell with that short sentence. However, he went on to paint a picture for people like myself.

"Suppose," John said, "the operator types 'cc -0 test.c' in a command line. The value of argc would then be three, argv[0] would equal 'cc,' argv[1] would equal '-0' and argv[2] would equal 'test.c'." For the first time, it was all starting to make sense. Let's take it one step further.

Imagine the string "cc" is stored at location 0x0900. If so, the pointer to argv[0] will be equal to 0x0900, the pointer to argv[1] will be equal to 0x0903 and the pointer to argv[2] will be equal to 0x0906.

Since the pointer stored at 0x0900 is a pointer to a character, we need to store that pointer. John picked location 0x0950 for his example. He put the next at 0x0952. If you look in memory at 0x0950 you will find 0x0900 — a pointer to a character is stored there. On the other hand, if you use the *argv[ ] convention, the value of argc and argv would look like this after your command line was parsed by the C compiler.

```
argc=2
argv[0] = "cc"
argv[1] = "-0"
argv[2] = "test.c"
```

Wrapping up our descriptions of this month's program listings, we see Bob Apida contributed some very short, very simple C programs. I think they'll give you a good starting point and a chance to get the feel of your OS-9 C compiler while you build up your confidence. In Bob's words, "These are my very first attempts at C programming so they may be a little ragged. I just hope they give some of your readers the courage to get started with the language."

Bob also suggested that we run a contest. "Give a prize (a Rolls Royce or Lear Jet or a copy of next month's RAINBOW) to the person who can write a program using the least amount of memory. You call it the 'I can write that program in 20 bytes' contest!" he said. Maybe we can do that sometime in the future. Gee! I can write that program in 'X' bytes!

Random Thoughts

It's time to start planning to attend Microware's 1985 OS-9 seminar in Des Moines. You'll find it a fantastic learning experience and a fun-filled three days. Besides, we'll have an OS-9 Users Group meeting there and hopefully pass the gavel to a new group of officers.

Speaking of officers, Bryan Lantz of Computerware fame has agreed to run for president. I endorse his nomination 100 percent. Additionally, George Dorner has agreed to fill another term as treasurer. He's doing a tremendous job so he should be a shoo-in. If you are a member you should receive your ballots sometime within the next month.

Because the Users Group hospitality room was such a hit at RAINBOWfest-Chicago, we may do it again in Princeton. And we plan to hold a formal meeting Saturday afternoon following the last RAINBOWfest seminar. Hope to see you there!

The Last Word

It's exciting to watch an operating system like OS-9 evolve, especially the software. During the past month and a half I have had a chance to look at several versions of Michael Bailey's mouse-based editor, *The Last Word*. He seems to be taking suggestions to heart and is working hard to make this program really shine.

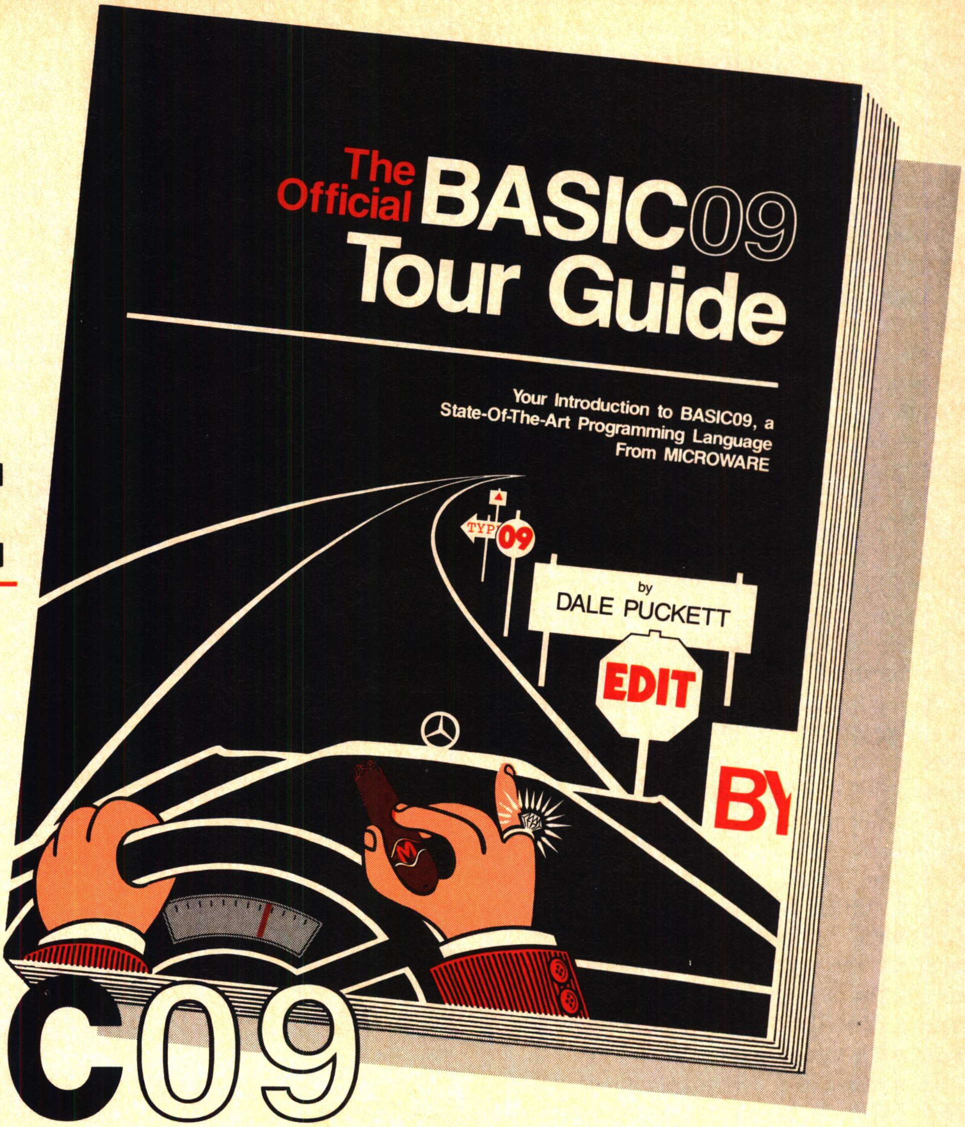
Since we wrote about the program last month, Mike has added several features. You can now access the pull-down menus from the keyboard. To do this you type a `CLEAR 0` and the cursor will jump to the menu bar. Once there,

```
        achar := getchar(input);
          IF (achar >= 'a') AND (achar <= 'z') THEN (* It's lowercase *)
             BEGIN
             achar := CHR( ORD(achar)-toupper );   (* So convert it *)
             write(output,achar)
             END
           ELSE
             write(output,achar)
         END; (* of a line *)
   WRITELN;
   READLN;
   IF INTERACTIVE(input) THEN GET(input);
   END; (* of the file *)

 END.

*****************************************************************************
*****************************************************************************
 program lower (input, output);

 CONST
    tolower = 32;

 VAR
    achar: CHAR;

 BEGIN (* main *)

 WHILE NOT EOF(INPUT) DO

   BEGIN
     WHILE NOT EOLN(input) DO
       BEGIN
       achar := getchar(input);
          IF achar IN ['A' .. 'Z'] THEN
            BEGIN
            achar := CHR( ORD(achar)+tolower );   (* So convert it *)
            write(output,achar)
            END
          ELSE
            write(output,achar)
        END; (* of a line *)
   WRITELN;
   READLN;
   IF INTERACTIVE(input) THEN GET(input);
   END; (* of the file *)

 END.
```

Listing 2:

```
Microware OS-9 Assembler 2.1   06/30/84 22:25:24                    Page 001
upper - Converts ASCII file to upper-case

00001          *  upper -- converts ASCII file to upper case
00002          *  (c) 1985  SMITHWARE
00003          *  6809 Assembly Language
00004          *  For TANDY Color Computer OS9 Version 01.01.00
00005          *  Contributed to public domain by:
00006          *     Mark W. Smith  72356,2677
00007          *     3513 Carlisle
00008          *     Latonia, Ky. 41015
00009          *     (606) 291-3039
00010          *  For use with a pipe or redirection:
00011          *     list infile ! upper
00012          *     upper </infile
00013          *
00014          *  use /d0/DEFS/OS9Defs
00015          *
00016                            nam   upper
00017                            ttl   Converts ASCII file to upper-case
00018                            IFP1
00020                            ENDC
00021                            opt   1
00022          *
00023          *
00024          *
00025          *  Data area
00026          *
00027   00D3           EOF       equ   211
00028   0001           FLAG      equ   1
00029 D 0000                     org   0
00030 D 0000           CHAR      rmb   1
00031 D 0001                     rmb   200          stack area
00032 D 00C9           MEMSIZE   equ
00033          *
00034          *
```

Get the most out of BASIC09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you move the cursor through the menu with the Color Computer arrow keys.

At our suggestion Mike set up the SHIFT left- and right-arrow keys to move from word to word through your text. Great! That's the way writers work. The tab functions are still available, however; they just use another key. The block move operations now highlight the selected text — like the Mac and the Model 100. This change makes it easy to see what you are moving and makes it harder to make mistakes.

The Last Word now lets you adjust your margins by pulling a marker along a ruler line at the top of the screen, and Mike says he plans to set it up so you can insert a number of menu bars throughout your text when you want to change margins. The flicker from joystick noise is now almost gone and the operation is much smoother.

Bailey has installed a "dir" command in his program that prints a list of the files in your current data directory in a window. To read a file into the editor's text buffer you simply point to it with the mouse and click — *déjà vu*. And, here's one you'll really like if you're a writer. Mike is installing an online dictionary. This means you will be able to check the spelling of a word or find an alternative spelling while you are typing. You'll do this by selecting the word with the mouse.

Programs like *The Last Word* and *The OS-9 Solution*, from Spectrum Projects, are moving our little Color Computers toward the state of the art. It's refreshing to see new ideas expressed and implemented. We asked Mike Bailey about his philosophy regarding OS-9 software development.

"While the 64K CoCo has some inherent limitations, OS-9 gives the little machine some very advanced capabilities. My goal here was not to clone a Macintosh product, but to combine that machine's user friendly interface with the power of OS-9 to create an advanced word processor ideally suited to the OS-9 environment," he said.

Next month? Jonathan Guthrie of Westerville, Ohio, wrote to tell us how to run OS-9 C with one disk drive. We'll pass his tips along with a few solutions to the "How do you remove the GOTO from the *PRIMES* program" question we asked in June. And, who knows what else will cross the desk or pop into mind. Till then, enjoy what's left of summer.

```
00035        *
00036        *  Program area
00037        *
00038   0011            TYPE     set   PRGRM+OBJCT
00039   0081            REVS     set   REENT+1
00040   0000 87CD0066            mod   PGMLEN,NAME,TYPE,REVS,START,MEMSIZE
00041   000D 75707065   NAME     fcs   "upper"
00042   0012            START
00043   0012 CC0000              ldd   #$0000     select std in & clr err reg.
00044   0015 108E0001            ldy   #$0001     select # of bytes to read.
00045   0019 30C4                leax  CHAR,u     point to char address.
00046   001B 103F8B              os9   I$ReadLn   read in char.
00047   001E 253B                bcs   error      branch on error.
00048   0020 9600                lda   CHAR       get character.
00049   0022 8D1A                bsr   isprint    go check for printable char.
00050   0024 26EC                bne   START      no ; loop back for next char.
00051   0026 8D2A                bsr   islower    yes; go check for lower-case.
00052   0028 2602                bne   putchar    no ; go with char.
00053   002A 8020                suba  #$20       else make char upper-case.
00054   002C            putchar
00055   002C A7C4                sta   CHAR,u     save char.
00056   002E CC0100              ldd   #$0100     select std out & clr err reg.
00057   0031 108E0001            ldy   #$0001     select # of bytes to read.
00058   0035 30C4                leax  CHAR,u     point to char address.
00059   0037 103F8C              os9   I$WritLn   write out char.
00060   003A 251F                bcs   error      branch on error.
00061   003C 20D4                bra   START      loop back for next char.


Microware OS-9 Assembler 2.1   06/30/84 22:25:32                   Page 002
upper - Converts ASCII file to upper-case

00062        *
00063        *
00064        *
00065        *  Subroutines
00066        *
00067   003E            isprint
00068   003E 817A                cmpa  #'z        char above printable range ?
00069   0040 2E16                bgt   done       yes ; return non-printable.
00070   0042 8120                cmpa  #$20       char below printable range ?
00071   0044 2D04                blt   cr         no ; go check carriage return.
00072   0046 0F01                clr   FLAG       yes ; reset flag and
00073   0048 200E                bra   done       return printable.
00074   004A            cr
00075   004A 810D                cmpa  #$0D       is char a carriage return ?
00076   004C 260A                bne   done       no ; return non-printable.
00077   004E 0F01                clr   FLAG       yes ; reset flag and
00078   0050 2006                bra   done       return printable.
00079   0052            islower
00080   0052 8161                cmpa  #'a        is char lower-case ?
00081   0054 2C02                bge   done       yes ; return lower-case.
00082   0056 0C01                inc   FLAG       no ; set not lower-case.
00083   0058            done
00084   0058 0D01                tst   FLAG       necessary to set CC reg.
00085   005A 39                  rts              return from subroutine.
00086        *
00087        *
00088        *
00089        *  Return error and finish
00090        *
00091   005B            error
00092   005B C1D3                cmpb  #EOF       finished with file ?
00093   005D 2601                bne   exit       no ; go exit with error #.
00094   005F 5F                  clrb             yes ; clear error reg.
00095   0060            exit
00096   0060 103F06              os9   F$Exit     exit module.
00097   0063 96B454              emod
00098   0066            PGMLEN   equ   *
00099                            END

00000 error(s)
00000 warning(s)
$0066 00102 program bytes generated
$00C9 00201 data bytes allocated
$1024 04132 bytes used for symbols

***********************************************************************

PROCEDURE uppercase
 0000      (* Contributed to public domain by Mark W. Smith *)
 0033      (* Converts a text into upper-case *)
 0058      (* Written in Motorola's BASIC09 *)
 007B
 007C      (* Declare strings and variables *)
 009F      DIM inpath:STRING[255]
 00AB      DIM char,cr,cls:STRING[1]
 00BF      DIM text:BYTE
 00C6      DIM offset,code:INTEGER
 00D1      cr:=CHR$($0D)
 00DA      cls:=CHR$($0C)
 00E3      offset:=-32
 00EB
 00EC      PRINT cls;
 00F2      PRINT "Enter pathlist of file you wish to convert to upper-case:"
 012F      PRINT
 0131      INPUT "",inpath
 0139      OPEN #text,inpath:READ
 0145      WHILE NOT(EOF(#text)) DO
 0150        GET #text,char
 015A        IF char<="z" AND char>=" " OR char=cr THEN
 0177          IF char>="a" AND char<="z" THEN
 018C            code=ASC(char)+offset
 0199            char:=CHR$(code)
 01A2          ENDIF
 01A4          PRINT char;
 01AA        ENDIF
 01AC      ENDWHILE
 01B0      CLOSE #text
 01B6      END

********************************************************************************

/*  asc -- ASCII conversion utility      */
/*  Written by Mark Smith                */
/*             Latonia, Ky.              */

#include <stdio.h>
#include <ctype.h>
#define YES 1
#define NO 0

main(argc,argv)
int argc;
char **argv;

{
     int c, upc;
     char *s, alpha[1];

     if (--argc == 0)  {
          printf("\n");
          printf("asc :   <options>  -l  -u  -?\n");
          exit(0);
      }

     while ((*++argv)[0] == '-')
          for (s = argv[0]+1; *s != '\0'; s++)
               switch (*s)  {
               case 'l':
                    upc = NO;
                    break;
               case 'u':
               upc = YES;
               break;
          case '?':
               printf("\n");
               printf("asc :   -l   converts file to lower case\n");
               printf("        -u   converts file to upper case\n");
               printf("\n");
               printf("       Sample calls --\n");
               printf("            asc -l <infile\n");
               printf("            asc -u <infile >outfile\n");
               printf("            list infile ! asc -l\n");
               printf("            list infile ! asc -u >outfile\n");
               exit(0);
          default:
               printf("\n");
               printf("asc :   illegal option -%c\n",*s);
               exit(0);
               }

while ((c = getchar()) != EOF)  {
     if (isprint(c) || isspace(c))  {
          if (isalpha(c))  {
               if (!upc)  {
                    c = tolower(c);
               }
               else  {
                    c = toupper(c);
               }
          }
     alpha[0] = c;
```

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```
          printf("%c",alpha[0]);
          }
     }
}

************************************************************************************


/* * * * * O-Pak utility - - - - nores * * * *

        by    Robert J Apida
             18 October 84
             San Diego, Ca.


        This utility will remove and unload the O-pak
HIRES screen utility, and place the user in the 32
by 16 standard os-9 screen format

        This utility is handy when running compilers
or other programs which will not run under O-pak HIRES
because of memory restrictions or compatability problems.

#include     <stdio.h>
#define      CLEAR     12
#define      C1        31
#define      C2        14
#define      C3        18
main()
        {
        putchar(C1);
        putchar(C1);
        putchar(C1);
        putchar(C2);
        putchar(C3);
        putchar(CLEAR);
        }.

*********************************************************************************



/* * * * * Command - - - - cls * * * *

        by    Robert J. Apida
             18 October 84
             San Diego, Ca.

        This command will clear the screen with a one
word command - - - cls.                   */

#include <stdio.h>

#define CLEAR     12

main()
        {
        putchar(CLEAR);
        }


*************************************************************************************


/*   --------- O-Pak Utility ---------- Change ---------
/*
/*           by    Robert J. Apida
/*                San Diego, Ca.
/*                16 January 1985
/*
/*      This program, when used with the O-Pak char. sets
/*  will allow the user to change the set with a single
/*  command line entry.
/*
/*      Initial requirements are that the char set be
/* installed in the excution directory. You may chose
/* to install your char. sets in another directory.
/* If this is the case, an os 9 path may be used.
/*
/*      This program requires that the standard
/* os 9 commands, echo and display, be installed
/* in the current exec. directory.  The program error
/* messages were set up using the 64 col. char. set */

#include     <stdio.h>
#define      CLS            12          /* clear screen */
#define      CMD            "display 1b 4a ; echo "
```

```
    main(argc,argv)

     int      argc;
     char     *argv[];

              {
         char *Cmd_Line[80];

         if (argc!=2)
              {
              help();
              if (argc >2)
                   {
                   printf("\n           Only ONE argument may be used with the change command....\
n");
                   }
              exit(0);
              }

         if (strlen(argv[1]) > 57)
              {
              putchar(CLS);
              printf("\n\n * * * *  COMAND ARGUEMENT OVER SIZED * * * *");
              exit(0);
              }

              strcpy(Cmd_Line,CMD);
              strcat(Cmd_Line,argv[1]);
              system(Cmd_Line);
              putchar(CLS);
              exit(0);
              }
    help()
              {
              putchar(CLS);
              printf("\n\n                      O-Pak Character Set Change\n");
              printf("\n          Format:\n");
              printf("\n              change [character set name]\n");
              printf("               or\n");
              printf("               change [/d0/directory/character set name]\n");
              printf("\n          Change will support full OS-9 path discriptors if the charactor set
    is not located in the current execution directory.\n");
              }
```

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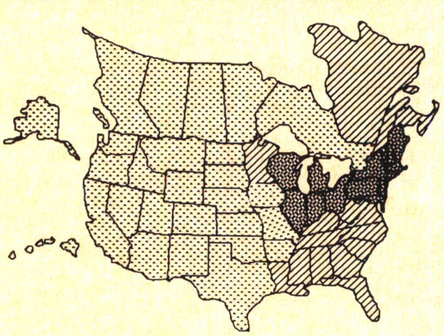

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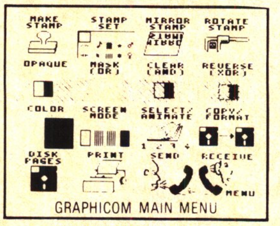
- U-S-E-R F-R-I-E-N-D-L-Y!
- 4 Display modes (Including Hi-Res red/blue artifact)
- Animate mode
- Color Palette with over 15 color patterns for use with Hi-Res artifact
- Send/Receive pictures over standard modem at 300, 600, or 1200 baud
- Supplied utility allows capturing Hi-Res screens from most COCO arcade games (even protected ones)
- Multiple Hi-Res character fonts (user, redefinable)
- Supplied utility for transferring Graphicom screens to Basic or other M/L programs
- Supplied utility for loading screens from Basic or other sources
- Built in Hi-Res SCREEN PRINT (compatible with EPSON, C-ITOH, GEMINI-10, OKI, plus Radio Shack's LP-VII, LP-VIII, DMP-100, DMP-200, and GCP-115 printers) from 110 to 9600 baud
- Slow-scan television SEND/RECEIVE options
- Many additional features, operating hints, hardware mod's and suggestions, etc



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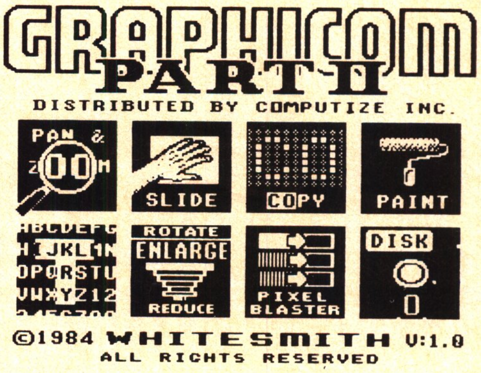

Graphicom Part II is a video processing package that provides many functions that are missing in Graphicom. Here are just a few of the features provided by Graphicom Part II:

ENLARGE/REDUCE/ROTATE
Enlarge or reduce any portion of a screen by any amount, just like a photographic enlarger! Independent of the enlargement or reduction, rotate by any degree or fraction of a degree about any point on the screen.

PAINT
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PAN & ZOOM
"Zoom in" x2, x4, or x8 on any portion of the screen to do fine pixel work. Allows editing of Graphicom character sets with ease!

TYPESETTER & FONT EDITOR
Add text in 16 different sizes with several display modes to chose from including COLORED FOREGROUND & BACKGROUND text! Edit 8x8 characters for use in the typesetter. Over 30 character sets supplied on disk. "GRAB" function allows transfer of some Graphicom character sets to Graphicom Part II format.

PIXEL BLASTER
Allows the user to easily substitute or remove colors. Widen lines, swap BLUE & RED without effecting BLACK & WHITE, etc.

GRAPHICOM PART II DOES NOT REQUIRE GRAPHICOM TO RUN!
Graphicom Part II requires a 64K extended disk basic system, it will load and save both standard BIN files and Graphicom screens, and supports 1 to 4 disk drives with keyboard or joystick (analog or switch type). All functions support color or Hi-Res operation, as well as 4 screen display modes.

Cat. No. 132WD

GRAPHICOM PART II-$24.95

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5C - Large character sets drawn with master design (from Derringer Software)
6C - Same as 5C but set up as stamp set
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9 - Miscellaneous Ads and Examples
10 - Miscellaneous Fonts
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13C - GRAPHICOM PART II function demo

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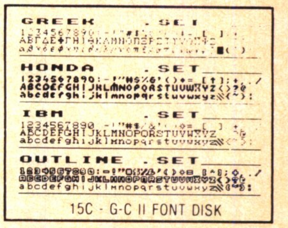

15C - G-C II FONT DISK

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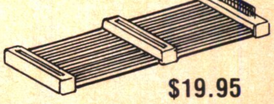

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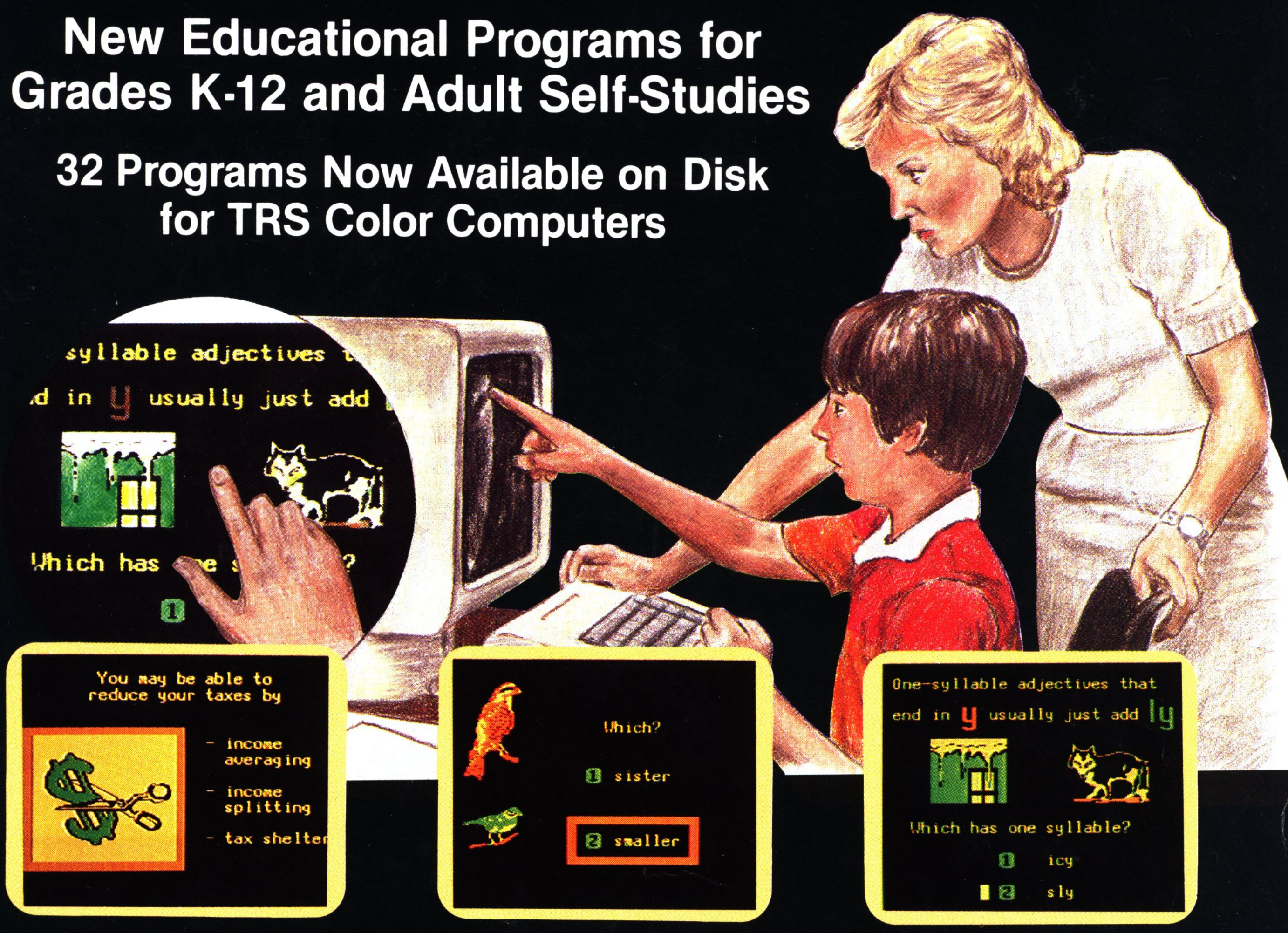
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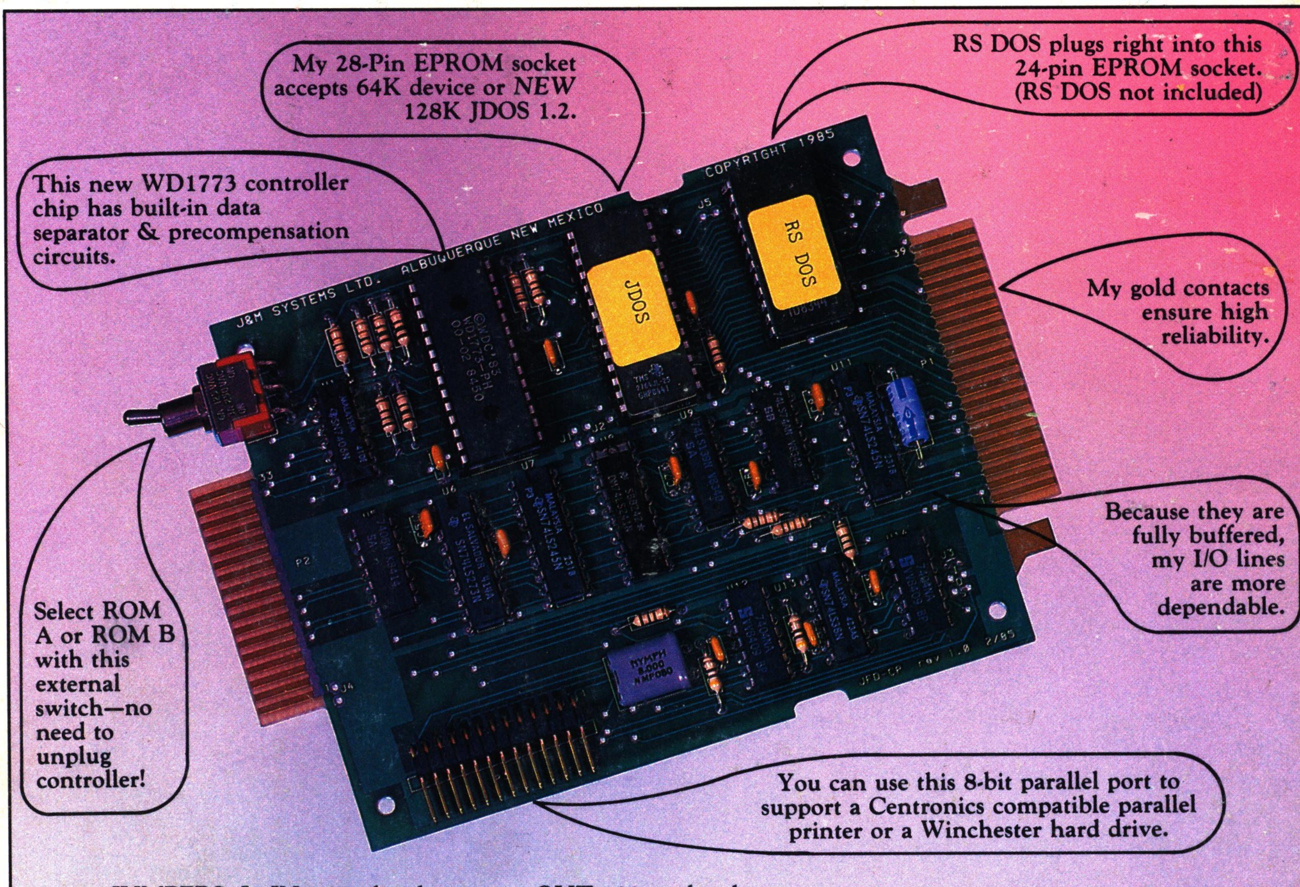
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Select ROM A or ROM B with this external switch—no need to unplug controller!
You can use this 8-bit parallel port to support a Centronics compatible parallel printer or a Winchester hard drive.
JDOS
RS DOS
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JFD-CP rev 1.0 2/85

JUMPERS: J1 IN—6ms head step rate; OUT—30 ms head step rate
J2 IN—serial printer; OUT—parallel printer
Jumper defaults apply only to JDOS.

New JFD-CP DISK CONTROLLER $149

Our new JFD-CP has redefined the state-of-the-art for Color Computer users. Gold contacts and fully buffered I/O lines ensure maximum reliability, and the JFD-CP is plug compatible with both the original COCO and the COCO-2.

New JDOS 1.2

JDOS implements all RS DOS commands, plus many more, including:

- auto line numbering
- error trapping
- baud rate selection
- OS/9* boot from floppy or hard drive
- Memory Minder†—the most advanced disk drive analysis system on the market (Dysan diagnostic diskette not included)

DRIVE 0 SYSTEM $289

Upgrade your Color Computer by adding our *new* JFD-CP disk controller, supercharged JDOS operating system, and a top quality drive with case and power supply: *All* for only $289! Comes complete with cable and manual.

Drive 0 System with one single side drive	$289
Drive 0 System with one double side drive	$359
Drive 0,1 System with two single side drives	$429
Drive 0,1 System with two double side drives	$499

MEMORY MINDER†

Memory Minder is a disk drive test program now included in JDOS. Used with a Dysan digital diagnostic disk, Memory Minder allows you to check your drives for speed, alignment, sensitivity, hysteresis, and more! You can actually align the drives while viewing the graphics on the screen. No special equipment needed!

DIAGNOSTIC DISKETTES

508-200: Tests single side disk drives	$26
508-400: Tests double side disk drives	$33

Memory Minder is available on diskette for those who don't own a JFD-CP Controller with JDOS. Includes Dysan diagnostic diskette.

Single Side Memory Minder Package	$79
Double Side Memory Minder Package	$99

*OS/9 is a registered trademark of Microwave, Inc.
†Memory Minder is a registered trademark of J&M Systems, Inc.

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